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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW

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A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

Everybody will be there!

A cordial invitation is extended to the men of the metal manufacturing industry in the United States and Canada to attend the Annual Convention and Exhibition of the American Foundrymen's Association, and the Annual Convention of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, Philadelphia, September 29th to October 3rd, 1919.

This gathering will bring together the greatest number of foundry owners, executives and engineers ever assembled at one time and will be representative of the iron, steel, and non-ferrous casting industries of the entire world.

As the first convention and exhibition to follow the Great War it will be of especial interest and significance. The application of time and labor saving equipment to offset rising operating costs and other important problems will be discussed. Bring your problems to Philadelphia and take new ideas home with you.

Philadelphia Pa.

WEEK OF SEPTEMBER 29th

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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

Vol. 17 NEW YORK, SEPTEMBER, 1919 No. 9

THE CONVENTION OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION

THE 1919 MEETING TO BE HELD JOINTLY WITH THE INSTITUTE OF METALS DIVISION OF THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS IN PHILADELPHIA SEPT. 29-OCT. 3.

WRITTEN FOR THE METAL INDUSTRY BY GEORGE B. GOODFELLOW.

Philadelphia, the "World's Greatest Workshop," is the ideal place for the convention of the American Foundrymen's Association. The city contains a greater variety of metal manufacturing establishments with a larger aggregate annual production value, and it has more leaders in various lines and can claim more "firsts" in industry as well as national history, than any other American city. Philadelphia is the "Cradle of Liberty," and the Philadelphia Foundrymen's Association is the parent of the American Association.

CORNER OF FOUNDRY OF THE J. W. PAXSON COMPANY, PHILADELPHIA, PA.

For these reasons, members of the local branch should be excused if they are found overstepping the bounds of their usual violet modesty in bragging a wee bit about their local foundries when entertaining the thousands

of delegates and visitors at the convention and exhibition. They will not be violating prohibition. Remember, the Liberty Bell was cast in Philadelphia in 1753. It originally came from England, but cracked at the first trial, and two local founders, Pass and Stow, were employed to recast it from the original metal. The bell was rung many times from the belfry of Independence Hall until 1835, when its present crack started, while the bell was being tolled during the funeral of Chief Justice of the United States Supreme Court, John Marshall.

In 1742 the first metal type cast in America was made by Christopher Saur in Germantown, which is now one of the finest residential sections of the city. After the Revolution and in the early part of the last century, brass casting for ornamental work, lamps, chandeliers, gas fixtures, and clock making was carried on to a large extent in the city.

The first furnace for smelting iron in the province of Pennsylvania was started in 1717 by one Thomas Rutter, a smith of Germantown, who, according to a letter in the collection of the Pennsylvania Historical Society,

A. O. BACKERT
President American Foundrymen's Association

CLARKE P. POND
Chairman Finance Committee
Sales Engineer, David Lupton Company
Photo by the Phillips Studio, Phila.

C. R. SPARE
Chairman Publicity Committee
Vice-Pres., Gen. Man., American Manganese Bronze Company
Photo by Bachrach.

From an early period in the city's history many tradesmen were employed in brass and bell-metal founding, and in copper, tin, and brass work of all kinds for distilleries, sugar mills in the West Indies, refineries of sugar in the colonies, and for various household utensils. In May, 1717, Austin Paris and Thomas Paglan, "founders" from England, were admitted to the freedom of the city of Philadelphia, a process necessary to enable them to carry on business for themselves. The records of a few years after that date show Paris established as a founder. Brass founding was carried on in 1723 on Front street near Market by John Hyatt.

During the Revolution, Benjamin Loxley, of Philadelphia, cast cannon, howitzers, mortars and shells for the Continental Congress and the Committee of Safety. In the Federal procession in Philadelphia to celebrate the ratification of the constitution, Daniel King, who years before had established a brass founding business, rode on a float with a furnace in full blast and cast and finished a three-inch howitzer, which was immediately mounted and placed on Union Green.

"hath removed a little further up the country to make iron." Iron founding was developed as one of the important early industries of Philadelphia, and the city at the present time is the leader in the United States in the production of iron foundry and machine shop manufactures, with an annual product valued at probably $200,000,000, although no official statistics have been compiled since the war and the present era of high prices started.

In 1860 the brass founders' establishments of the city numbered 31, with a total capital of $350,000, using $274,000 worth of material, turning out annually $571,000 worth of products, and employing 340 hands. In 1870 there were 45 brass foundries, turning out more than $1,000,000 worth of products. In 1880 the number was 38, with capital of $782,000, using $832,000 worth of material, and turning out $1,370,000 annual products. At the same time there were 4 bronze casting foundries with annual production worth $501,000. At the present time there are hundreds of foundries casting brass, bronze and other non-ferrous compositions. Their an-

HOWARD EVANS
Secy. Phila. Foundrymen's Assoc.
Vice-Pres. J. W. Paxson Company

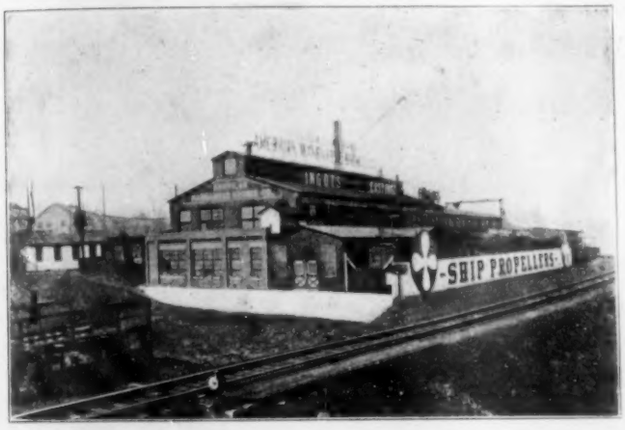
H. M. BOUGHER
Chairman General Clearing House Committee
Pres. J. W. Paxson Company

GEORGE PETTINOS
Chairman Information Committee
Photo by J. Mitchell Elliot.

nual production value has not been compiled since 1910, when brass and bronze products alone were rated at an annual value of $4,000,000. They are now worth many times that amount.

Philadelphia has many large foundries and machine shops which grew up from the first experimental efforts in their respective lines. Among such concerns are the Baldwin Locomotive Works, founded in 1831; William Cramp & Sons Ship & Engine Building Co., which dates from 1830; William Sellers & Co., Midvale Steel & Ordnance Co., Bement Miles, Southwark Foundry & Machine Co., and a number of others. All these places employ thousands of men in the various departments, and almost all of them do their own brass casting.

The United States Mint has a very complete non-ferrous foundry, refinery and shops, which may be said to be the oldest establishment in the city or the United States doing a continuous business under one management since its start, although of course the mint has not been operated on the same site since the first one was established in 1792. Philadelphia's history is full of instances of foundry businesses, as well as of other



FOUNDRY AND MACHINE SHOP OF AMERICAN MANGANESE BRONZE COMPANY, HOLMESBURG, PA.

lines of industry, which flourished for a time, only to be absorbed by some larger concern, fail in one of the periodical panics, or simply die out with the passing of the owner and founder.

One of the oldest exclusive bronze foundry firms in the city, and one whose products have been seen and admired more than those of any other foundry in the United States is Bureau Brothers, founders of bronze statuary and memorial tablets. For more than 50 years this firm has done special work for noted sculptors, architects and designers, and can claim to be the pioneer in this line of work in the United States. Many of the beautiful statues and monuments all over the country are their productions.

In 1859 Achille Bureau landed in Philadelphia from France where he had learned his art, and first found employment with Miskey Merrill & Co. at Fifth and Race streets, manufacturers of chandeliers and ornamental railings. After a few years, young Bureau went with Robert Wood & Company, 1136 Ridge avenue, in whose foundry he cast the first statuary made in this country. After the failure of the Wood firm, Bureau started for himself at Ninth & Poplar streets. He died in 1888, and his sons, Edmond W. and Edouard S. Bureau have continued the business. Both these men are of a type seldom seen in American business management. During working hours thy are usually found in overalls on the floor of their foundry working with their men, and their establishment is by no means a petty affair.

White & Brother, Inc., now celebrating its golden anniversary as a firm, is one of Philadelphia's oldest smelters and refiners of bronze, brass, babbitt metal, solder and type metals. In 1869 William H. White and Amasa White founded the business, and today it is controlled and operated by two sons of one of the founders. Improved scientific methods have made White & Brother one of the largest and most reliable manufacturers of ingot metals in the world. The firm boasts of having names of active customers on its books now who started buying in 1869.

The Philadelphia plant of the Ajax Metal Co., established in 1880, is the largest individual plant in the world for the exclusive manufacture of railway bearings, ingot and babbitt metals. Occupying at its start a building with a 25 foot frontage, this plant now covers almost a full city block. In addition to this main plant the company has a branch at Birmingham, Ala., for the southern and southwestern trade, and another at Bridesburg, just north of Philadelphia for concentrating foundry by-products. Last year 30,000,000 pounds of Ajax metals were turned out. A total of about 600 men are employed.

One of the newer developments of the Ajax company is an electric induction furnace for the melting of yellow brass. This will be exhibited at the convention next month. C. H. Clamer, vice-president of the company, described this Ajax-Wyatt furnace in an article printed in the August issue of THE METAL INDUSTRY. Although the furnace has not been openly advertised, 90 of them have already been sold.

Probably the oldest and largest foundry supply house in the country is the J. W. Paxson Company, miners and distributors of foundry sands, gravels and clays, and manufacturers of facings, supplies, and mechanical equipment. The business was established in 1855 by John W. Paxson, a Quaker born not far from Philadelphia. He started in the moulding sand business at 950 Beach street, from where he moved after a few years to the present location, North Pier 45, where ample dock facilities could be had for handling materials. Paxson was later joined by J. K. Bougher, and the business was expanded to include the manufacture of brushes, sieves, and foundry appliances, and the grinding of facings, compounds, etc. The business was incorporated in 1897, and in 1904 the company built its own foundry and machine shop for making mechanical appliances, which it had previously obtained by outside contract. Mr. Paxson died in 1906 and Mr. Bougher in 1908.

The company at present employs about 500 men in the various departments, works and quarries. It owns and operates many pits and quarries for the different grades of sands, clays and gravels; it has three tugs, seven steam barges, and eleven towing barges, as well as the works and shops necessary for the manufacture of the many articles of foundry supplies and equipment. The officials of the company are H. M. Bougher, president and general manager; Howard Evans, first vice-president; S. C. Bougher, second vice-president; Sherman Bougher, secretary, and F. B. Platt, treasurer.

George F. Pettinos, with offices in the Real Estate Trust Building, is an extensive dealer in facings, sand and gravel, foundry machinery and equipment. Prior to May, 1918, he was a partner in the firm of Pettinos Brothers, which had been in business for 25 years at Bethlehem, Pa. Mr. Pettinos employs about 150 men.

GENERAL ANTHONY WAYNE

Foundry of Bureau Brothers, Philadelphia, Pa., one of the oldest statuary molding firms in the United States. This statue now stands at Valley Forge.

One of the largest brass and bronze foundries in the city is that of the William Cramp & Sons Ship & Engine Building Company, which during the war turned out 800 propeller wheels for transports, cargo vessels and war ships of various classes built in the Cramp yards and in other shipyards on the Atlantic Seaboard. This foundry casts about 1,000,000 pounds of marine bronze a month and employs 300 men. In addition to ship propellers, the output of the foundry includes stern tube bushings of bearing metal, pipe connections of steam metal, and various parts and fittings of compositions prescribed by the government for different uses. In all, 80 compositions are used. Before the period of extreme rush in shipbuilding the Cramp foundry made many castings for automobiles, dairy machinery, and other contract work.

The present brass foundry was started in 1885, previous to which time the Cramp castings were made by John Bradford. F. M. Chambers is the superintendent in charge of the floor work in the brass foundry. In addition to the non-ferrous castings, Cramp has a steel foundry using 2,000,000 pounds of metal a month, and an iron foundry using 3,000,000 pounds a month.

The Cramp business is one of the largest concerns in Philadelphia, employing a total of more than 11,000 men. The properties owned and controlled consist of the following: The main plant, covering 47 acres, on which are eight shipways, three wet basins, warehouses, powerhouses, foundries, shops and office buildings, also five miles of standard gauge railroad track; the Kensington shipyard and drydock department of eight acres, containing piers, shipsheds, drydock and various repair shops; the Federal Steel Foundry Company, covering six acres with complete equipment for casting and machining heavy steel castings. In addition to its marine work Cramp has done a large business in building water turbines. The Cramp company, with the Kerr Navigation Corporation of New York, were recently taken over by a new holding company, the American Ship & Commerce Corporation, with an authorized capitalization of $60,000,000.

Another concern equipped for heavy work is the American Manganese Bronze Company, whose foundry and shops are at Holmesburg, in the northern section of the city. This company specializes in ship propellers, large castings for hydraulic work, centrifugal pump casings, turbine runners, valve bodies, worms and worm gears, bridge bearings and large bushings. The main foundry is equipped with two fifteen-ton electric cranes, and metal for large castings is melted in a reverberatory furnace of fifteen tons capacity, so that exceptionally heavy pieces can be cast. The officials of the company are James B. Curtis,

president; C. R. Spare, vice-president and general manager, and T. H. Addie, vice-president and treasurer and sales manager.

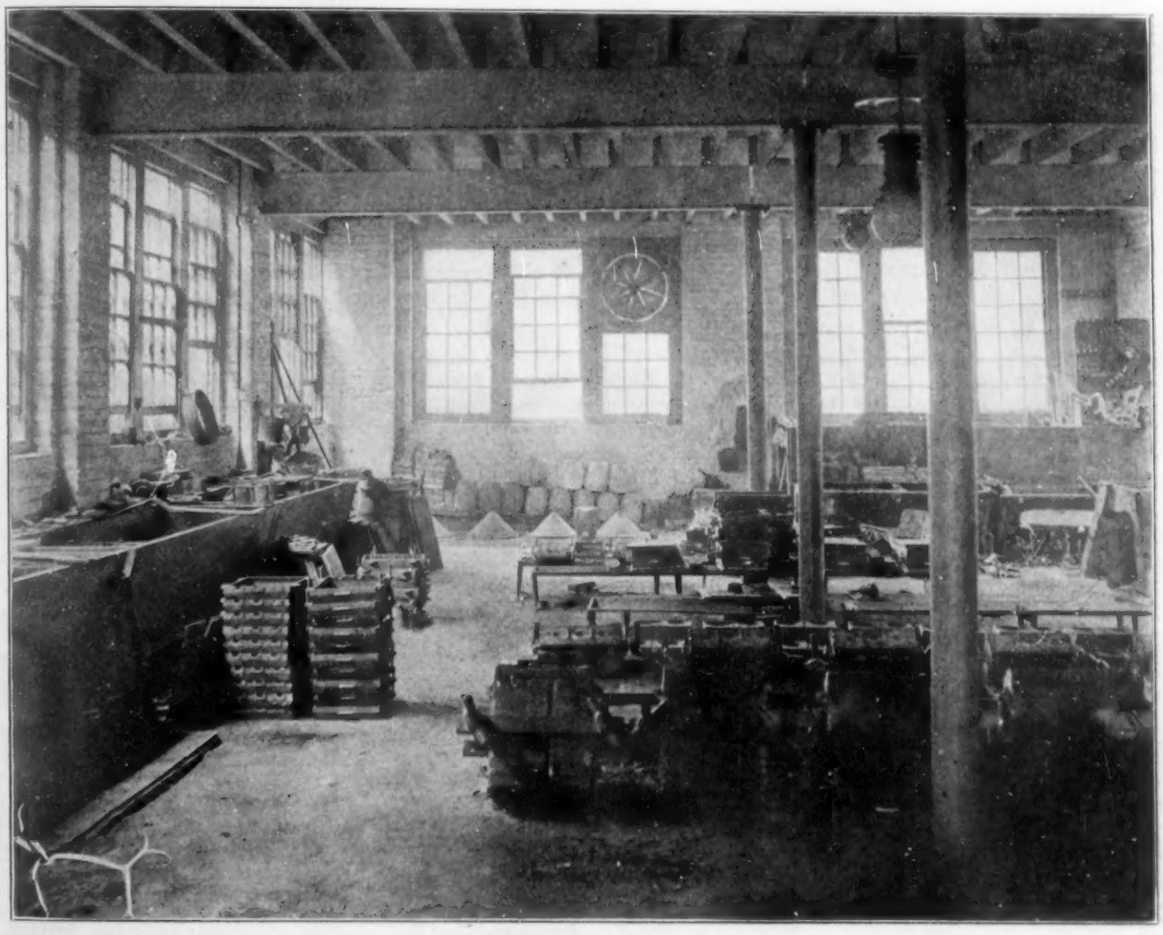
The Verilite Metals Company is one of the infant industries of the Quaker City, being now in its second year. In this brief period of existence, with no salesmen out and with only a small amount of advertising, the company has taken on as customers some of the leading manufacturers of this country and Europe. The output of the plant is non-ferrous metal in ingots for the trade, and a small amount of formal casting work in brass, bronze and aluminum. The special metals owned and manufactured exclusively by the Verilite Company are Verilite, Goldite and Bronzite. The first named is the leader, a composition of virgin aluminum with carbon-free chromium and some other high grade metals. The composition is said to be entirely free from zinc, non-corrosive, light as aluminum, durable, and with a high degree of tensility and elongation.

This new alloy is said to be going into extensive use in aeroplane and automobile parts, engines, containing rings for ball bearings, bushings, truck wheels, instruments and many kinds of metal specialties. It machines easily, quickly and clean. The officers of the Verilite Metals Company are Henry A. Bomberger, president; G. A. Krause, vice-president and chief engineer of the plant; S. H. Clendenin, secretary, and H. F. Sieber, treasurer.

Paul S. Reeves & Co., Inc., established in 1868 at 760-62 South Broad street, is among the oldest brass and bronze jobbing foundries in the city which has done a continuous business at the original stand. The establishment was started by Paul S. Reeves, who later took his son into partnership. The business was taken over and incorporated in 1912 by the present management. The foundry is equipped with the latest forms of mechanical equipment, overhead cranes, moulding machines, pneumatic rammers and chippers.

Castings from one-quarter pound to 15,000 pounds can be made. In addition to brass bronze and aluminum job work and castings for propellers, turbines and tube plates the company manufactures ingot bronze, brass, manganese copper, phosphor copper and babbitt metals.

During the war rush much government work was done for army and navy ordnance, bureau of steam engineering and the hull division. The offices of the company are Leo MacFarland, president; P. L. Balentine, treasurer, and E. J. Decker, secretary and manager. Ralph L. Lovell, a propeller expert, is consulting engineer.



CORNER OF FOUNDRY OF THE J. W. PAXSON COMPANY, PHILADELPHIA, PA.

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The chairman of each of the following committees is also a member of this committee.

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Thomas Devlin, the veteran president of the Philadelphia Foundrymen's association, is chairman, *ex officio* of all committees, and Howard Evans of the J. W. Paxson Co., Philadelphia, is general secretary.

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Air Reduction Sales Co	New York, N. Y.
Ajax Metal Co	Philadelphia, Pa.
American Gum Products Co	New York, N. Y.
American Kron Scale Co	New York, N. Y.
American Manganese Bronze Co	Philadelphia, Pa.
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Cleveland Osborn Mfg. Co	Cleveland, O.

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Lincoln Electric Co.....Cleveland, O.
Lindsay Chaplet & Mfg. Co.....Philadelphia, Pa.
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Louden Machinery Co. .....Fairfield, Ia.
David Lupton's Sons Co.....Philadelphia, Pa.

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McCrosky Tool Corporation.....Meadville, Pa.
McLain's System, Inc. .....Milwaukee, Wis.

Maclean Publishing Co.....Toronto, Can.
Macleod Company, The .....Cincinnati, O.
Magnetic Manufacturing Co.....Milwaukee, Wis.
Mahr Mfg. Co. .....Minneapolis, Minn.

Malleable Iron Fittings Co.....Branford, Conn.
Marden, Orth & Hastings Co.....New York, N. Y.
Arthur C. Mason, Inc.....Hawthorne, N. J.
Maxon Premix Burner Co.....Muncie, Ind.
The Menefee Foundry Co.....Fort Wayne, Ind.
Mercury Mfg. Co. .....Chicago, Ill.
The Metal Industry.....New York, N. Y.
Metal & Thermit Corporation.....New York, N. Y.
Michigan Smelting & Refining Co.....Detroit, Mich.
Mifflin Chemical Co. .....Philadelphia, Pa.
Alexander Milburn Co. .....Baltimore, Md.
Mine & Smelter Supply Co. .....New York, N. Y.
Monarch Engineering & Mfg. Co.....Baltimore, Md.
Monarch Machinery Co.....Philadelphia, Pa.
Mott Sand Blast Co. .....New York, N. Y.
Mumford Molding Machine Co.....Chicago, Ill.

Napier Saw Works, Inc.....Springfield, Mass.
National Engineering Co.....Chicago, Ill.
Wm. H. Nicholls Co. .....New York, N. Y.
Norma Co. of America.....New York, N. Y.
Norton Co. .....Worcester, Mass.

Oakley Machine Tool Co.....Cincinnati, O.
S. Obermayer Co. .....Chicago, Ill.
Ohio Blower Co. .....Cleveland, O.
George Oldham & Son Co.....Philadelphia, Pa.
Oliver Machinery Co. .....Grand Rapids, Mich.
Oxweld Acetylene Co. .....Newark, N. J.

Pangborn Corporation .....Hagerstown, Md.
J. W. Paxson Co. .....Philadelphia, Pa.
Penton Publishing Co. .....Cleveland, O.
Charles E. Pettinos .....New York, N. Y.
Geo. F. Pettinos .....Philadelphia, Pa.
Philadelphia Grease Co. .....Philadelphia, Pa.
Pickands, Brown & Co. .....Chicago, Ill.
Pittsburgh Crushed Steel Co.....Pittsburgh, Pa.
Pittsburgh Furnace Co. .....Milwaukee, Wis.
Henry E. Pridmore, Inc. .....Chicago, Ill.
Portage Silica Co. .....Youngstown, O.
Providence Gas Co.....Providence, R. I.

Quigley Furnace Specialties Co. .....New York, N. Y.

Racine Tool & Machine Co.....Racine, Wis.
Railway Mechanical Engineer .....Chicago, Ill.
W. J. Rainey .....Philadelphia, Pa.
Reed, Fears & Miller.....Philadelphia, Pa.
Republic Creosoting Co. .....Indianapolis, Ind.
Rich Foundry Equipment Co.....Chicago, Ill.
Richards Wilcox Mfg. Co. .....Aurora, Ill.
Robeson Process Co. .....New York, N. Y.
Rogers, Brown & Co. .....Cincinnati, O.
P. H. & F. M. Roots Co.....Connersville, Ind.

Sand Mixing Machine Co.....New York, N. Y.
Wm. Sellers & Co., Inc.....Philadelphia, Pa.
Shawinigan Electro-Metals Co.....Cleveland, O.
Shepard Electric Crane & Hoist Co....Montour Falls, N. Y.
Simonds Mfg. Co. .....Fitchburg, Mass.
Skinner Bros. Mfg. Co.....St. Louis, Mo.
W. W. Sly Mfg. Co.....Cleveland, O.
R. P. Smith & Sons Co.....Chicago, Ill.
Werner G. Smith Co. .....Cleveland, O.
Spencer Turbine Co. .....Hartford, Conn.
Standard Sand & Machine Co.....Cleveland, O.
Standard Shop Equipment Co., Inc.....Philadelphia, Pa.
Sterling Wheelbarrow Co. .....Milwaukee, Wis.
Strauss & Buegeleisen .....New York, N. Y.
Sullivan Machinery Co. .....Chicago, Ill.
Swan & Finch Co.....New York, N. Y.
Swind Machinery Co. .....Philadelphia, Pa.

Tabor Mfg. Co. .....Philadelphia, Pa.
Thomas Elevator Co. .....Chicago, Ill.
Thomas Iron Co. .....Hokendauqua, Pa.
Lewis Thompson & Co., Inc.....Philadelphia, Pa.
Truscon Steel Co. .....Detroit, Mich.

United Compound Co. .....Buffalo, N. Y.
United States Graphite Co. .....Saginaw, Mich.
U. S. Molding Machine Co.....Cleveland, O.
United States Silica Co.....Chicago, Ill.

VanDyck-Churchill Co.	Philadelphia, Pa.
Vibrating Machinery Co.	Chicago, Ill.
T. A. Willson & Co.	Reading, Pa.
Wadsworth, H. L.	Cleveland, O.
Wadsworth Core Machine & Equip. Co.	Akron, O.
Walter H. Wangelin & Co.	St. Louis, Mo.
J. D. Wallace & Co.	Chicago, Ill.
Warner & Swasey Co.	Cleveland, O.
Westinghouse Electric & Mfg. Co.	Pittsburgh, Pa.
White & Bro., Inc.	Philadelphia, Pa.
Whitehead Bros. Co.	New York, N. Y.
Whiting Foundry Equipment Co.	Harvey, Ill.
T. B. Wood's Sons Co.	Chambersburg, Pa.
E. J. Woodison Co.	Detroit, Mich.
Whitman & Barnes Mfg. Co.	Chicago, Ill.
Young Bros. Co.	Detroit, Mich.

A FEW OF THE EXHIBITS

PANGBORN CORPORATION

The equipment, which will be in operation, will include in various types and sizes Cabinet Sand-Blasts, Barrel Sand-Blasts, Hygienic Rotating Table Cabinet Sand-Blasts, Rotary Table Sand-Blasts, Hose Machines, Sand Separators, Dust Arresters and Exhausters.

In addition to the operating Equipment they will use a stereoptican to illustrate actual installations made and installed throughout the country, in varied lines of foundry and other manufacturing practice. The exhibit taken as a whole, will cover comprehensively the advance in manufacture, design and application of Sand-Blast Equipment for more than a decade.

The Company will be represented by: Thomas W. Pangborn, President, John C. Pangborn, Vice President, and others.

MINE AND SMELTER SUPPLY CO.

There will be in actual operation a small Wilfley Table working on the separation of brass foundry ashes. They will also have on display several types of crushers, oil burners, refractory clays, etc., and will be in a position to furnish prospective customers with full information regarding their various foundry products. Representatives will be E. S. Tompkins, Sales Manager and John C. Beam, Sales Engineer.

THE S. OBERMAYER COMPANY

This company will have a large exhibit showing full line of latest foundry supplies and also an electric testing furnace showing the protection of their Hott Patch Furnace to Fire Brick and linings. The exhibits will be in charge of Mr. S. T. Johnston, Vice President.

QUIGLEY FURNACE SPECIALTIES COMPANY

This company will demonstrate the use of Hytempite, a highly refractory plastic material for bonding fire brick and for kindred uses. They will give by means of electric furnaces, temperature tests on the bonding strength of Hytempite and will exhibit various metallurgical applications in foundry practice.

They will also exhibit and demonstrate Carbosand which is a highly refractory fire sand for making rammed in linings, special tile and repairs to furnace structures.

Samples and demonstration of Insulbrix, a specially prepared cellular insulating brick for furnaces or other structures.

Part of the booth will also be devoted to the Quigley Powdered Coal System for preparing, transporting and burning powdered coal.

Representatives in attendance will be: W. S. Quigley, President, J. H. McPadden, Secretary, and the entire sales force.

HOEVEL MANUFACTURING CORPORATION

This company will have a working exhibit of sand-blast barrel and table machine at booth 242-244 of the Foundrymen's Convention at Philadelphia. They will be represented by Mr. H. F. Hoevel, Mr. L. B. Passmore and others.

AMERICAN MANGANESE BRONZE COMPANY

An Olsen Testing Machine of 100,000 pound capacity will be shown intheir booth and they will pull test coupons for exhibitors, gratis.

J. W. PAXSON COMPANY

They will occupy booths 305-309 inclusive, to exhibit Foundry Supplies and Equipment. Representatives will be H. M. Hougher, President, Howard Evans, Vice President and Secretary of the Philadelphia Foundrymen's Association, and I. F. Kremer, Advertising Manager.

SHAWINGAN ELECTRO-METALS COMPANY

The exhibit will show Magnesium in some of the forms in which they manufacture it. Donald P. Falconer, U. S. sales agent, will be in charge.

THE HAUSFELD COMPANY

They will exhibit the Hausfeld non-crucible furnace of the tilting type and the crucible furnace of the tilting type, the stationary crucible furnace and the Hausfeld aluminum melting furnace of the tilting type using cast iron melting pot, the Hausfeld oil feeder attachment and motor-driven pump unit, the Hausfeld ladle and crucible heater and Hausfeld ingot molds.

This company will be represented by E. B. Hausfeld, president; Joseph E. Hausfeld, treasurer, and J. S. Armour, manager of furnace department.

THE W. W. SLY MANUFACTURING COMPANY

The following will be exhibited: One large picture showing dust arrester; 1 30/40 sandblast mill, complete in every detail; 1 No. 6 turntable sandblast cabinet; 1 hand cabinet; 1 sandblast cage; 1 28x48x¾ in. tumbling mill, complete; 1 No. 1 resin mill, complete; 1 No. 2 sandblast pressure tank, complete; 1 set photographs and rack; 1 set sandblast test plates.

Representatives will be Mr. W. C. Ely, president, and Mr. Geo. J. Tanner, vice-president.

DUTY ON GRAPHITE

A bill (HR 5941) has been introduced in the House of Representatives which provides for the following duties:

First: Crude Graphite ores, crystalline of amorphous, 1 cent per pound of ore for ores containing 50 per centum or under of graphite carbon, 2 cents per pound of ore for ores containing over 50 per centum of graphite carbon, the term crude graphite ores being defined for the purpose of this Act as ore which has not been subjected to any process of refining or concentration which changes the graphite content of the ore as mined.

Second: Lump and chip crystalline graphite (plumbago, silver lead), 3 cents per pound of graphite, the term lump and chip being defined for the purposes of this Act, as larger crystals of graphite more or less broken up in mining and treatment, of a size which will not pass through a screen with openings of one quarter inch square.

Third: Flake crystalline graphite (plumbago, silver lead), crude concentrates and refined flake, 6 cents per pound of graphite, the term flake being defined for the purposes of this Act as smaller crystals of graphite more or less broken up in mining and treatment, of a size, which will pass through a screen with openings one-quarter of an inch square.

Fourth: All other products, manufactured materials, and compounds containing graphite, crystalline or amorphous, not specifically provided for in this Act, 5 cents per pound for the graphite contained therein.

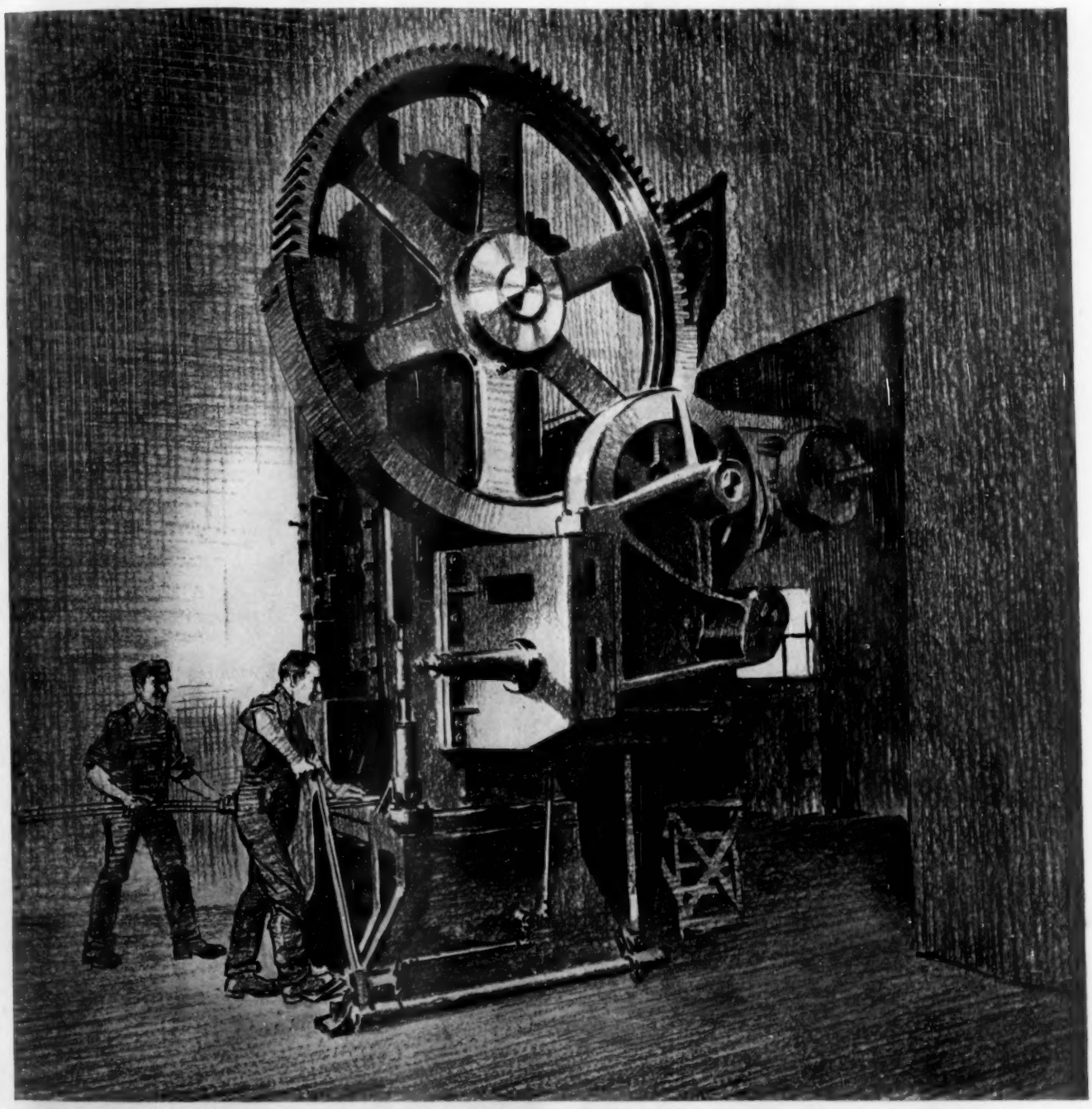
According to several prominent manufacturers, these duties will have a most harmful effect.

1. Silver lead would go up 50 per cent in price. All gray iron castings will be affected, as 80 per cent of foundry facings are made of imported plumbago, and the quality cannot be duplicated in this country.

2. Paint manufacturers would pay 40 per cent more as graphite is 33⅓ per cent of all graphite paint pigments. It will raise the cost of painting houses, steel and other structures. Lubricants will be affected in like proportion.

3. Crucibles would advance $1 each.

4. Crucibles could not be cleaned as well as formerly and would last only one-fourth to one-half as long.



AN EXCELLENT VIEW OF A LARGE STAMPING PRESS IN ACTUAL OPERATION IN THE MILL OF THE CHASE METAL WORKS, WATERVILLE, CONN.

THE MANUFACTURE AND HANDLING OF CRUCIBLES

AN ARTICLE GIVING SOME OF THE CAUSES FOR THEIR FAILURE IN METAL MELTING PRACTICE.
WRITTEN FOR THE METAL INDUSTRY BY JONATHAN BARTLEY.*

[Mr. Bartley is so well known as a crucible manufacturer that it is unnecessary to defend him as an authority on graphite subjects. We are pleased to be able to present this article to our readers and we are sure that what he says will be found very valuable to crucible users.—Ed.]

JONATHAN BARTLEY

One of the most, if not the most aggravating contingency that confronts the crucible user now and then is a leaky crucible. Not only is it a source of annoyance in the delay of his work, but it is expensive due to the loss of metal, the labor of reclaiming it from the ash-pit, and the dislodging the grate bars, ofttimes resulting in serious injury to the workmen. It is of such serious moment that one experience will stamp the incident so vividly on the mind of the user that it requires a long time to eradicate it. For this reason the crucible maker should have before him at all times the possibility of the origin for the cause being traced to his own door, and the user also should know how improper handling on his part could bring about a condition that produced these disastrous results.

To consider first what might occur in the course of manufacture to produce such condition, we must begin at the material, and then hold close to natural laws, making certain compensation for ordinary judgment in the way of manipulation. There are four main points wherein the crucible maker may be held responsible for a leaky crucible:

1. Poor material; 2. Imperfect mixing. 3. Hasty drying. 4. Rapid kiln burning.

MATERIAL

The selection and preparation of the different ingredients that go to form a crucible mixture should be done with great care. Experiments should be confined to the laboratory until a reasonably safe conclusion is reached, to justify their being carried to the foundry floor and even then, never without the full knowledge and consent of the user.

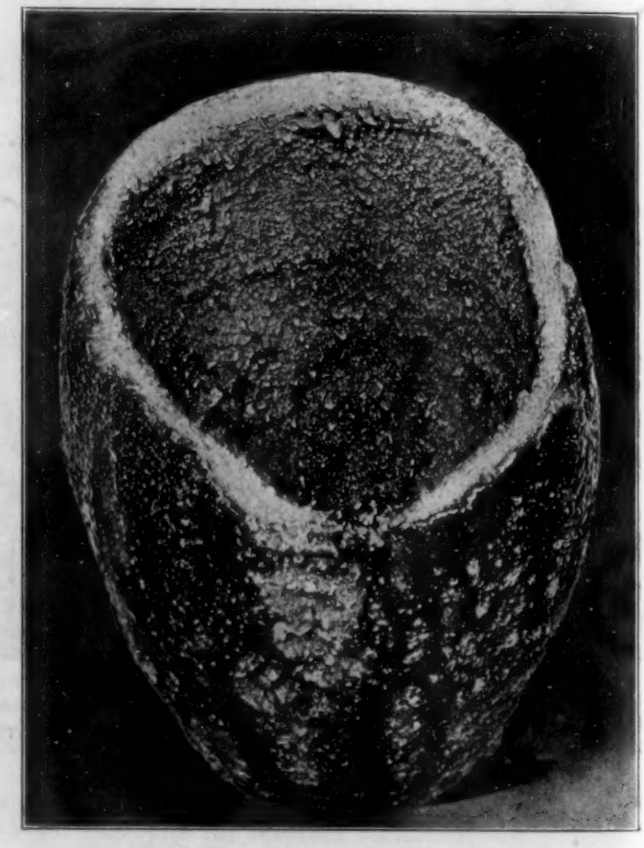
In the selection of the graphite the word "carbon" carries little weight with a competent crucible maker, because if he gets a graphite with the proper formation to give him the finished flake without an over quantity of fines he can judge the carbon almost to a single point.

In using a high grade of this particular type there is little risk taken on the graphite. It is essential, however, that the other ingredients be free from all foreign matter. A dirty car used in the shipment of the clay might be a direct cause for trouble on the foundry floor, as little splinters of wood which might adhere to the clay and be carried into the wall of the crucible, would burn out under heat making a gateway for a leak. Unless great care is exercised nails will find their way into the mixture through the careless opening of the graphite barrels. Every crucible maker knows that a magnet placed in a barrel of tailings that has not passed through a magnetic separator will be covered with small flakes of iron resembling very closely the graphite flake, which are nothing more or less than ground nails. These are the things that do actually happen every day and it requires that "eternal vigilance" to prevent them because workmen, as a rule, become more or less careless. Assuming however that the material is as perfect as human energy can make it, the next cause we have mentioned is

IMPERFECT MIXING

When one considers the terrible punishment a crucible must stand, it is easy to comprehend that the body or walls must be thoroughly cemented. This requires first, a good binder, then a most thorough mixing. If this is not done properly the clay will not evenly associate with the particles of other material, and while it may have sufficient cohesive quality to hold together during the process of making, the cohesion is lost at the dry stage with the positive assurance of a leaky pot.

Conditions should be observed in order to get a perfect mixing. Material that might require a certain amount of water one day might change obviously within the next few days due to climatic conditions. Clay as a rule absorbs moisture more readily than it discharges it, so that all these things have to be watched and compensated for in order to keep the mixture uniform. In



DISTORTION BY ILL-FITTING TONGS

* Manager of New York office George Pettinos, importer and refiner of graphite, Philadelphia, Pa.

the use of old crucible shells one can see a vast difference in the moisture contained, which naturally bears one way or the other, and winds up with an unsafe mixture.

HASTY DRYING

In the making of graphite crucibles the shrinkage is compensated for by building the molds larger in size. As an illustration we will take the regular size No. 150. Finished, ready for use this crucible is 19″ high

SCALP—DUE TO POOR ANNEALING

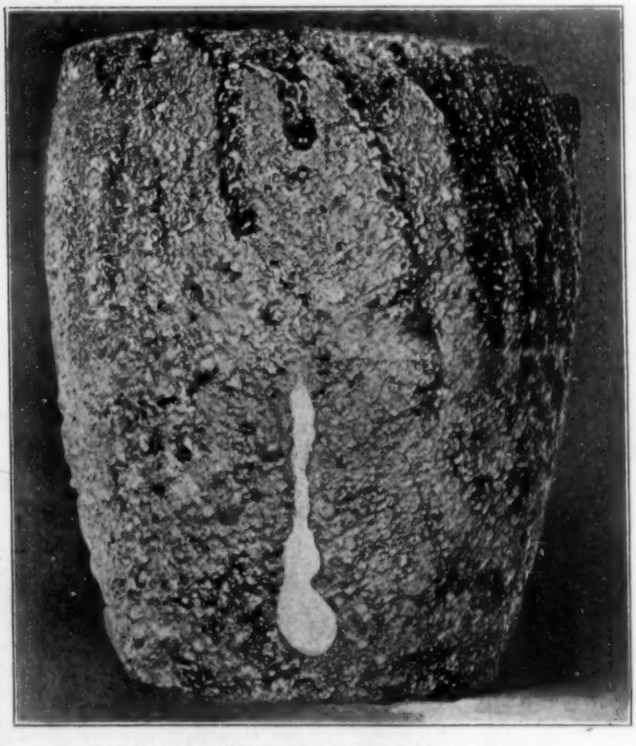
and 13½″ diameter at the top. When it leaves the mold it is 20″ high and 14¼″ diameter at the top. In other words this mass of plastic material must be drawn together 1″ in height and ¼″ in diameter. Nature has her own way of doing this and keeping the mass perfectly homogeneous, and any variation therefrom inevitably results in fractured walls and a leaky crucible. Some years ago I made a very interesting experiment along these lines on some crucibles of this size that were tried out in Cramp Ship Yards, the Supt. cooperating. Selecting 25 crucibles that were made from the same mixing I took 4 of them and by giving special attention succeeded in getting them sufficiently dry to pass the kiln burning within one week. The balance were given 6 weeks natural drying. When they arrived at the foundry no one could have told one from the other, nor could any difference be shown by any physical test such as the "ring," etc, but the furnace test gave a record of 2.3 and 4 heats on the four forced dried ones, while the highest run on the others was 19 and the lowest 14 heats. No better evidence could be asked for.

RAPID KILN BURNING

What happens in too hasty drying can also happen in too hasty burning in the crucible maker's kiln. Allowing Nature her way in drying, giving her all the time necessary, it will be found that she has failed to expel all the free moisture. As a rule under the most favorable drying conditions there will remain from 4% to 5% of this moisture when it enters the kiln, which, though small as a unit, means something in volume. An ordinary No. 60 crucible weighs 35 lbs. Four per cent. means 1.4 lbs. of water. The ordinary kiln will carry 1,200 crucibles, so that 1,500 lbs. of water must be thrown off before the calcining begins. To do this safely the heat should be brought up gradually, or the same thing will occur as in too hasty drying, although possibly not to the extent. Evidence of too hasty firing can be seen in the mottled appearance of the burned crucible, which shows that the moisture has been hastily drawn to the surface and condensed.

OTHER REASONS

There are other minor reasons which might cause leaky crucibles such as using very dry plaster-of-paris molds. Very dry molds absorb the moisture from the mixture very rapidly, often to the extent, on large pots, of having a separation take place at the line of making, part of the mixture clinging to the mold while the other part fastens itself to the rib or form. In exaggerated cases this is noticed, but how often it occurs in light form that cannot be observed is seldom taken in consideration. At the same time it is a dangerous advocate for a leaky crucible. Very dry molds should be moistened at the beginning to avoid trouble of this kind because once a graphite mixture separates under centrifugal action, there is no strong adhesion afterwards.



METAL LEAKING THROUGH PIN HOLE

This form of trouble is seen in the web of metal which ofttimes interweaves the entire wall of the pot. These are the causes for leaky crucibles considered from the maker's standpoint.

CAUSES THAT MIGHT BE DUE TO FAULTS IN THE FOUNDRY

Having disposed of every reasonable theory to trace the cause for leaky crucibles to the maker let us now take up some of the causes that might be brought about by the user, because there is no question but that very often this trouble is due to conditions in the foundry, some of them a direct violation of natural laws, while others are what might be called conditions over which the user has only partial control. The cause for leaky crucibles due to foundry practice are:

1. Improper annealing. 2. Poorly fitting tongs. 3. "Soaking." 4. Careless re-charging.

The really most important factor of these is the ANNEALING, yet it is an unfortunate fact that with the majority of foundrymen this means simply getting the crucible "warmed up" prior to putting it in the furnace with little thought given to the method used.

There has been so much written on the subject of annealing that it is not necessary to go over the beaten path. In fact our object at this time is only to point out the CAUSES which produce the EFFECT and content ourselves that we have treated the subject neutrally. Every foundryman should know that hasty annealing is just as bad as insufficient annealing, or even worse as the latter would quite naturally end in a "scalp," rendering the crucible useless without any further damage, while the former would be in direct line for a leaky pot due to sudden expansion that causes internal fractures without any outward indication. Where annealing ovens do not exist it is the usual practice to use the top of the furnace, and there is no reason why this cannot be safely done provided ordinary judgment is used, but to place a cold crucible where the one side will be subjected to an intense heat while the other side is exposed to cool air is radically wrong. Although graphite itself is almost entirely inert, more than 50 per cent of the other contents are clay, a body that expands readily under heat, and it is easy to see how a crucible under the above conditions would be severely strained through unequal expansion. Heat induction should be made perfect throughout and unless this is done there is a very great chance for a leaky crucible.

TONGS

This subject, like that of annealing, has been thoroughly covered many times, and next to annealing it is highly important. One of the best articles written on the matter of tongs was written some years ago by Dudley A. Johnson, and there is probably no man in the United States today better posted in foundry work and practice in general than "Dud." "Tongs" has been and still is one of his hobbies, his contention being that poorly fitting tongs is one of the direct causes for leaky pots. There is a natural reason for annealing, while the tongs are a physical proposition which boiled down means "safety" on the one hand, "disaster" on the other. In other words, well fitting tongs means giving the pot every possible advantage in safe handling, but ill fitting tongs bring unequal strain at points that are injurious to the crucible. At the time of pour the wall of a crucible is elastic and readily responds to an uneven pressure, and from this can be seen how easy it is for a badly fitting tongs to squeeze a pot out of shape on one heat and back again the next. It does not require a vivid imagination to find out what happens inside the walls while this is going on. It is a very true statement to make that if foundrymen were more careful with the fit of their tongs there would be fewer leaky crucibles.

SOAKING

If a foundry working on an eight hour schedule should continue its motive power to ten or twelve hours without accomplishing anything the management would be eligible for an asylum because it would simply be losing the energy of the fuel, with the expense of the wear and tear added. The same thing applies to crucible soaking. To get the best service from a crucible the pour should be made just as soon as the metal is sufficiently fluid. Holding it in the fire further than this means that much of its life is being worn out without delivering anything in return, at the same time subjecting it to the pernicious influences that arise from poor fuel, or being exposed to oxidizing conditions whch usually cause leaks.

CARELESS RE-CHARGING

Although it is only in rare cases that the trouble or cause for leaky crucibles would be found in the charging process it is safe to point out that it might possibly be a germ of the disease. During the melting period it is necessary at times to remove the furnace cover and recharge as the solids dissolve and in doing this ofttimes the furnace man will carelessly drop the ingots into the crucible instead of using the tongs and placing them easily. While damage from this source is rare, yet there have been cases where crucibles have shown leaks due to abuse of this very kind.

These to our mind are the general causes for leaky crucibles. This opinion is based on experience and observation, and given from an entirely neutral point of view with the hope that it may result in a healthy co-operation between maker and user that will bring forth good fruit in the way of eliminating the greatest of all foundry trouble.

RELIEF OF CABLE CONGESTION

Continuing its efforts to improve the foreign communications of the United States, the National Foreign Trade Council has written the American Chambers of Commerce in Europe, urging them to take action similar to that initiated by the National Foreign Trade Council in this country to obtain relief from the present cable congestion.

If the Governments of Great Britain and France can be induced to cut down the enormous number of Government cables which they are sending, there would be much greater opportunity for the transmission of important commercial messages to the Orient via India.

Most cordial replies were received to this request, a letter from Hon. William C. Redfield, Secretary of Commerce, stating:

"In response to yours of July 25, let me say that the President orally requested the department heads today to assist in the cable problem (1) by avoiding the use of cable or wireless for routine messages or those of minor importance; (2) by waving the preference over important commercial messages of such Government messages as may be sufficiently important to be sent by cable or wireless but where a day or two delay is not material.

"I think this will go into effect in a short time and I trust it will be helpful."

PRODUCTION COST AND PROFIT CONTROL IN NON-FERROUS FOUNDRIES

A New Method of Keeping in Touch With the Cost of a Product at Any Stage of its Manufacture

Written for The Metal Industry by Walter Glenn Scott*

The purpose of this paper is to bring specifically to the attention of non-ferrous foundries matters which I believe can be of general benefit to the industry. This paper, however, is applicable as well to other branches of foundry work.

In describing a successful installation of graphic production control, with cost and profit control as a by-product, it might be well first to consider the inefficiencies met in the industry.

(1) Prices based on snap judgment, without any estimated cost analysis.

(2) Taking work regardless of own estimates, simply because some one else made a lower bid.

(3) Failure to estimate and submit prices on each specific pattern.

(4) Work taken at uniform pound prices, without regard to specific quantities and kinds of castings under consideration.

(5) No consideration of the expense of clerical work and of getting ready for very small jobs.

(6) No equitable method of proportioning profits on various work.

(7) No method of control of the rates of production, anticipated in cost estimates.

(8) No method of charging direct labor times against specific work.

(9) No facilities to insure a "Job Ahead" basis for all workers, machines, benches, floors and other working places.

(10) No facilities so that the amount of available work ahead of machines, benches, floors, and other working places is known.

(11) No control over stores, receipts and disbursements.

(12) Gate, sprue and riser factors not considered in making cost estimates.

(13) The factor of scrap, not considered in making cost estimates.

(14) The weight of castings per mold, not given sufficient consideration in cost of production of work.

(15) Cost of rigging up and getting ready, not considered in estimating cost prices of specific jobs.

(16) Overheads sometimes applied as percentage on direct pay roll.

(17) Overheads, which vary as the pounds produced, sometimes applied as percentage on direct labor, or in proportion to direct labor, machine or floor hours.

(18) Overheads, which vary as direct labor or machine hours applied, sometimes charged in proportion to weights produced.

(19) Coremaking and cleaning and finishing overheads and melting costs, sometimes lumped with molding overheads.

The above takes no account of the peculiar practices of operation in individual foundries. The variety of equipments used is very extensive. Where one foundry may make a great success with certain equipment and methods of operation, others engaged on work of identically the same nature are opposed to the introduction of same type of equipment or manner of doing the operation.

The variations from standard and best practices are very extensive, and the above is merely listed as illustrative of the most usual deficiencies in methods of management. If I were asked specifically to suggest in few words, the principal matters which foundries in general should consider in their methods, it would be the following:

(1) Foundries should operate on a uniform system of cost estimate and control. The same general scheme is applicable to small foundries, as well as large. If you will consider that, in actual installations, the range of non-operating and operating personnel engaged has been as low as 22 on one hand, to a thousand and over in other cases, this argument is convincing.

(2) Prices on castings should never be given as blanket prices, that is, at so much per pound for a customer's casting business, unless you have stated in your contract the specific quantities to be made from each pattern. Preferably prices should be made on each individual pattern.

(3) You should have some means of continuously checking up, or control, so that you can know that your production rates equal what you anticipated they would be, in your cost estimates.

It is well before discussing the standards and ideals possible in the foundry industry, which have been obtained in many instances, to summarize briefly some of the principal features of the installations, which will be described in the last part of this paper. This will enable the reader to obtain a better idea of what I have in mind.

GRAPHIC MANAGEMENT

This specific application of graphic management is for the purpose of control of production of machines, benches, floors, men, and in fact, any place where operations are performed on product, directly or indirectly. The control of cost and profits, as has been stated before, is incidental to the control of production. The following principal mechanisms are more or less closely related with details of this control, namely:

(1) Control boards, located in the general office, or central planning department, which give a suitable place for scheduling on a time basis against individual production units, all the work ahead of these places, as well as the men who are selected to perform it.

(2) Dispatch or job holders, which are located in the shop in intimate contact with the place of work, and which are used for display in plain sight, the "Job working on" and the "Next jobs to do," covering, however, the current work, usually ten hours on jobs ahead, which have been transferred from central control boards.

(3) Dispatch or job boards, which are located in more general places, and which display in plain sight, the "Job working on" and the "Next jobs to do" for those workers who are not at all times located at one place during the performance of their functions. In like manner, they hold only the current day's work, that is, about ten hours of work in jobs ahead.

(4) Dispatch or tool racks for holding of miscellaneous patterns, gates, plates, core boxes, chills or inserts on the "Next jobs to do," so that they may be definitely located when wanted.

(5) Furnace control boards, which are located

*C. E. Knoeppel & Co., Inc., New York.

in the shops convenient to furnaces which melt the metal, indicate to furnace men the schedules of heats to be arranged for during the current day, and the time when it will be necessary to have specific metal of various analysis ready to pour specific molds.

To secure anticipated productions, costs and profits is the ideal of all executives. It is also desired that basis for estimating or predetermination of above matters, be true and dependable, for without equitable methods there can be no security. Good management presumes a sound basis for the following matters:

A means of predetermination or estimating costs of work, which is founded on practical production rates.

That margins of profit be added proportionate to productive capacities utilized.

That means of shop control be available whereby any variations from estimated figures may be known, NOT AFTER WORK HAS BEEN FINISHED, but in an intimate contact with the actual doing of it. It is desired, if possible, to be able to adjust matters going wrong before serious losses have taken place.

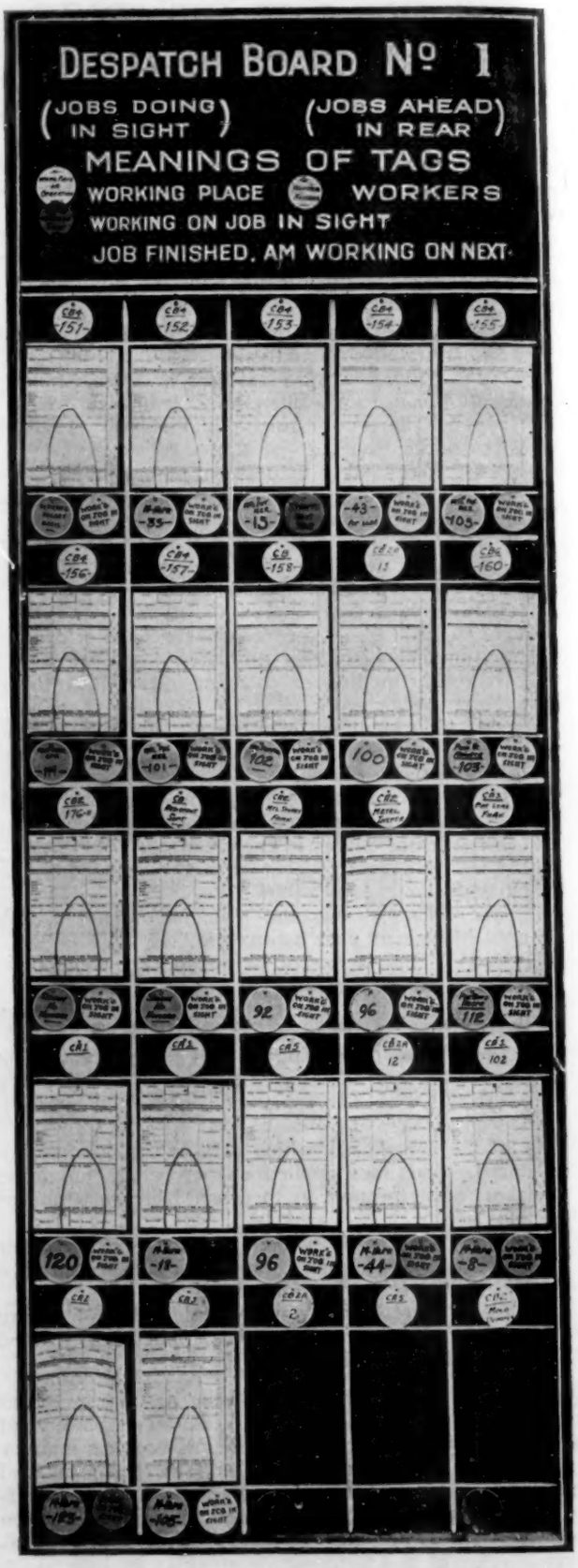
A wide experience and knowledge gained by contact with methods of foundry industries of today, reveals conditions far from the ideals set forth. This, I believe, is particularly so with those engaged in the manufacture of non-ferrous metal castings.

Probably the nature of this business, in which numerous very small organizations are engaged, has led many to ignore ideas or attempts at systematic procedures. That size of organization does not warrant snap judgment estimate and control, is plainly shown by the over-night existence of many of these concerns.

Determination of normal capacity, overhead ratings, conversion rates and shrinkage factors for many non-ferrous foundries, has proved to me that they are as uniform as could be expected, when size of business, equipments, locality and natures of product were considered. When figured on a uniform, sound, true and equitable basis, which makes the cost of manufacture of equivalent work for these concerns very much the same, they have been found very similar, as against widely varying figures with the methods I usually found in use.

The variety of costing procedures is really grievous, and I am not surprised at the usual marked difference in prices submitted for identical work by different foundries. As a matter of fact, in bidding on specific lots of castings, that is, bids based on equitable and true costing methods, time and again it has been truly distressing to see work taken at prices where I knew the loss could not be otherwise than very large for our competitor. There is only one true set of principles for foundry costing, and there are very few who have the proper knowledge of what they are. Systems in force in many instances are a liability and hazard rather than an asset.

Most costing overheads should be applied on a productive time basis, inasmuch as in the last analysis, IT IS TIME YOU ARE SELLING AND NOTHING ELSE. If through adequate and timely production control, productions are made true to the hours of shop and machine capacities scheduled for their accomplishment, and your costing overheads are applied to your product on the same basis, you have an adequate means whereby you can control those things which you have predetermined or scheduled for taking place. This, as a matter of fact, is the means by which the cost of work can be followed up in such intimate contact in the actual doing of it, that you are continuously assured of the profits and costs which you have previously anticipated. If the production rates are not maintained, then of course since overhead and labor are applied on the same basis, you know you are not producing the work at the price at which you have taken it.



My usual next step of analysis in a plant after the proper overheads, conversion rates and shrinkage factors have been determined, is to determine on this new basis the cost of production of the work actually in process. I have generally found a very large proportion of current work being done at an actual loss. Of course, this is a matter which should have been expected, if you consider that the average costing procedure is not based on right principles.

When, on the other hand, an analysis is made of the profit earning capacities per machine, floor, bench or tub hour for the most favorable jobs, the figures have again been found to be very illogical. Of course production capacities, other than the above, which were utilized in making the completed casting, were also considered as entitled to their share of profit earning capacity. This analysis always indicated that some jobs were most profitable and others far below what should have been expected.

It in fact appeared to me that the rate of making profits is a matter little understood by the majority of foundrymen, probably because this is the determinative factor brought about by a well organized cost and production control, which many do not have.

If it was recognized in taking work, that machines, benches, working floors and workers represent increments of the total profits producing capacity, then various jobs would be more equal in earning value. It ought to be very evident that the ordinary method of figuring profits, as a percentage on the total manufacturing cost, will not necessarily mean with jobs of equal total cost, that the management has been equally efficient in the production of earnings.

Adjustments through graphic production control methods, that is, rearrangement of methods of operation, putting the most profitable work first, adjustments in prices and many other things, has enabled us in many instances to turn a losing business into one of large profits. But first, we must have the right principles of cost and production control as the determinative and controlling factor for basing our decisions.

The basis of shop and cost control is knowledge advertised to everybody relative to proper procedure. It is in this way that a broad minded vision of an organization as a whole, is given to each individual, so each will be able to visualize how his part of the work is related to that of the next person, as well as the detailed condition and facts of shop operations.

As a matter of fact, on analysis of the deficiencies of the average organization, a whole lot of trouble can be blamed on indecision and ignorance. Whatever we are able to do to bring decision and understanding to the point of habit, that is, relative to production, cost and profit control, will result in a much better feeling and increased efficiency in the business as a whole.

As we will explain in later sections of this paper, it is through graphic charts, illustrating methods in detail, and the graphic control boards, dispatch boards and graphic signals, that matters of schedule and progress, maintenance of cost estimates, and irregular conditions, are set forth so glaringly and with such publicity, that knowledge of deficiencies does not remain covered up as under ordinary circumstances.

I believe that you will agree that in order to operate efficiently, not only must methods and principles be right, but these methods and principles must have such an inherent nature that systematic initiative may be taken.

Another factor which we recognize in the methods and means in connection with proper production, cost and profit control, are the psychological effects produced on employees, in the shop, as well as elsewhere.

It is very difficult to explain to the uninitiated just how these matters of production, cost and profit control are handled as related to psychological effects. But we wish to state most emphatically that their importance is greater than most people have any idea of.

At the same time there should be no misunderstanding relative to the above factors. Any scheme of administration and management is doomed to failure, which is not based on the broad principle of man-building. With the methods, policies and procedures fully organized, such as I will outline in the later portions of this paper, the following ideals and standards are attained:

Through progress records and control boards operating under graphic principles, the operation status of any order of production and how soon the total order, or any portion thereof, will be ready for shipment, is immediately available. This, it should be recognized, is a foundryman's greatest selling argument with customers.

The exact location of all sections of orders, as they progress through the operations of manufacture, is specifically and immediately known, and we can also locate the points of congestion, if any.

Knowledge of available productive capacities existing on any floor, machine, bench or other working place, is available in terms of the latest standard production rates for each working unit, that is, the basis on which the predetermined cost is represented. Available production capacities are known for months ahead.

With adequate true costing methods, it is known on just what jobs we are losing money and those on which we are making money. We know of this condition by operation as it actually exists in intimate relation with the doing of the work.

As a matter of fact, through these methods of production and cost control, this knowledge finally becomes anticipative to a marked degree, and it is for this reason that we call it "Cost Control."

If you will recollect, it cannot do the executive any good in 95 per cent of the production situations, to find out that his cost was too much after the job has been finished. What the average executive desires is to be assured that predetermined costs are being equalled or bettered, and a means of knowing this while work is being done. A basis such as this, means that the executive is enabled to figure closely, really to manage his business and to select the best of available work to do.

Inasmuch as control boards are a moving picture of "up to the minute" conditions existing in shops, and auxiliary graphic signals signify anticipative follow ups and actual happenings, there is a basis for systematic adjustment of irregular conditions, such as machine breakdowns, want of material, absent workers, and so on. The control board furnishes a basis for publicity as to everything out of regular order, as well as that which is going right. You will recognize this as an incentive to keep things going right.

It is often desired to visualize proportions of work of various classes of production which are scheduled against shops. This is also stated in the hours capacity taken up by these various classes of business.

Under graphic production control methods, it is always known how much available material, in hours' work at standard rates of production, is ahead of each production unit, and this can decrease and make rare, delays and hold-ups to production so

often occasioned by these conditions. On the other hand, this principle enables us considerably to reduce the amounts of stock in manufacturing process; probably not so much in foundries as in machine shops, but still the principle is existent. It automatically prevents undue congestion at inadequate operations.

By means of graphic production and cost control, we have a basis for slow evolution to efficient standard rates of production on all operations performed in the average foundry. By schedule and follow up, what is developed as the latest practice, is maintained until a more advanced development is made.

Available shop capacities shown on the Control Board Map, furnish an incentive to sales departments to sell the type of work that can be produced at unscheduled production units. Inasmuch as we can place against each and every one of our units of production, all orders on hand which can be applied at such places, the prospective necessity of more work will be known for a considerable period ahead. This will give time for sales efforts to materialize.

A monthly profit and loss account comes as a matter of course from the basic matter accumulated in carrying out all the above. It is not built on estimates and figures not concurrent with the given monthly period, as the usual profit and loss account is made up, but on actual true current conditions.

Normal capacity, overhead rates are based, of course, on the predetermination of costs, that is, cost estimates on which new business is taken. This is essentially logical from the very fact that normal capacity conditions are the basis on which the business is planned. Also we have current monthly overhead rates which we use as a basis of qualification of normal capacity rates, as well as comparisons of efficiency of the management for successive monthly periods.

As we have stated before, overhead rates under best practice, are mainly applied on a productive basis, that is, a productive machine hour, a productive labor hour, a tonnage production and a quantity production basis. Regardless of that much used criterion, the percentage overhead relation to the productive pay roll, it is really your hourly overhead rates compared with current production capacities which you wish to remain constant from period to period.

This is the first of a series of articles. The next will appear in a subsequent issue.

ELEMENTS OF ELECTRO-CHEMISTRY

SOME INSTRUCTION FOR THE PLATER WHO WISHES TO UNDERSTAND THE THEORY OF WHAT HE DAILY PRACTICES.

WRITTEN FOR THE METAL INDUSTRY BY JOSEPH HAAS, JR.*—SEVENTH PAPER.†

MIGRATION OF IONS.

The phenomena of electrolysis show that when an electric current is passed through a solution of an electrolyte, there is a mechanical movement of the ions of the electrolyte toward the electrodes, as explained under "Process of Electrolysis." Experiments have shown that the velocity with which ions move is not the same in all cases. Some move faster than others. This fact has been shown or deducted from the fact that concentrations around the electrodes vary. However, in any electrolyte, since there must be the same number of positive and negative charges for the solution to remain electrically neutral, if a positive ion is deposited an equivalent amount of negative ion must also be deposited. If this were not the case, there would be an excess of negative charges, which would make the subsequent separation of positive charges difficult, as an excess of negative charges would exert a large influence.

Both negative and positive ions must participate in carrying the current but not necessarily in equal amounts. Considering the quantity of electricity to be conveyed as (1) it may be carried by positive and negative ions in equal amounts or three-quarters by positive and one-quarter by negative ions, or any other fractions.

Some explanation in regard to velocity of ions is also necessary. If a charged particle (ion) is placed in an electric field, there is a definite force acting on it, just as when anybody suspended in air has the force of gravity acting on it, tending to pull it down. If the electric field is uniform, the force, like gravity, is constant. Such a force will not cause the particle to move with uniform speed, but like a falling body with uniformly accelerated velocity. However, an ion in a solution is not comparable to a heavy falling body, as much as it is to a rain drop falling through air encountering great resistance from the air. As a rain drop does not constantly increase its speed while falling through the air, but reaches a limiting velocity with which it moves, no matter how far it falls; so an ion moving through a solution encounters a very great resistance, and cannot travel far with constant acceleration, but, due to repeated collisions with molecules of solvent and undissociated sólute reaches an average velocity which experiment has shown to be very small. The limiting velocity of a rain drop depends upon the intensity of the force of gravity acting on it. So the velocity of an ion depends on the intensity of the electric field driving it, which is known as "potential gradient." The volt, the measure of the difference of potential between two points, is used to express the potential gradients in "volts per centimeter length." This means that if in a plating solution the volt meter shows a reading of 3 volts and the electrodes are 30 cm. apart (nearly 12 inches), the potential gradient $= \frac{3}{30} = 0.1$ volts per cm. The velocity of elementary ions is a periodic function of the atomic and rises in each series of elements. Those analogous elements with atomic weights greater than 35 have approximately equal velocities. The velocity of complex ions generally decrease with increase in molecular weight.

Nothing better illustrates the way in which the velocity of an ion depends upon the potential gradient as Ohm's law, which says that in any conductor the current is proportional to the difference of potential driving. Of course, it must be remembered that variation of temperature, concentration, etc., affect the current. Similar conditions must prevail. Ohm's law may be stated for conductors 1 cm. long and 1 sq. cm. in cross, that current density is proportional to potential gradient. Since

*Mr. Haas is now back in this country after serving eighteen months in the Overseas Surgical Instrument Repair Unit with the American Expeditionary Forces in France.

† This series began in April, 1918.

the number of ions in a solution and the charges on the ions does not depend on the application of potential gradient, the only way in which the current density can be affected by varying gradients is by the velocity acquired by the ions. Therefore, ionic velocities are proportional to the potential gradients producing them. This has been proven to be so by experiment. The velocity of an anion is represented by Va and that of the cation by Vc.

When it is desired to determine the velocity of an ion, the following equation is used:

$$V^x = \frac{D}{t} = \text{cms. per second}$$

where D = distance in centimeters,
t = time in seconds,
V = velocity,
x = voltage applied.

Example.—If three volts is the potential applied at the terminals, and an ion moved 15 cms. in 6 minutes, the equation would be:

$$V^3 = \frac{15}{360} = 0.0416 \text{ cms. per second.}$$

When it is desired to know the velocity under a potential gradient of one volt the equation would be:

$$V^1 = \frac{D}{t \times E}$$

where E is voltage applied.

In the above problem this would be:

$$V^1 = \frac{15}{360 \times 3} = 0.0138 \text{ cms. per second.}$$

When V^1 is known, V^x is gotten by equation:

$$V^x = E \times V^1$$

There has been found by experiment to be a distinct relation between the velocity of the ionization and the concentration changes at anode and cathode sections. This relation has been expressed by the equation:

$$\frac{\text{Loss in anode section}}{\text{Loss in cathode section}} = \frac{Vc}{Va}$$

In words this is stated that the ratio of the loss in the anode section to the loss in the cathode is as the velocity of the cation to the velocity of the anion. This can be illustrated by experiment as follows. Take a rectangular glass jar and fix into it by means of paraffin wax two porous plates, thus dividing the jar into three sections. In the two end ones Pt electrodes are placed and into each section 10 equivalents of HCl. Fig. 1.

96,540 coulombs of electricity are passed through the solution. Then upon analyzing it is found that (1) middle section still contains 10 equivalents of H Cl; (2) anode section contains 9 1/6 equivalents; (3) cathode section 9 5/6 equivalents. Therefore in all one equivalent of H Cl has been lost. Therefore as a result of electrolysis:

$$\frac{\text{Loss in anode section}}{\text{Loss in cathode section}} = \frac{5/6}{1/6} = \frac{5}{6} \times \frac{6}{1} = \frac{5}{1} = \frac{Vc}{Va}$$

Expressing the above in tabular form we would have:

	Anode		Middle		Cathode	
	Eq. H^+	Eq. Cl^-	Eq. H^+	Eq. Cl^-	Eq. H^+	Eq. Cl^-
Loss by separation.....	...	1	...	...	1	...
Loss by migration.....	5/6	...	5/6	1/6	...	1/6
Gain by migration.....	...	1/6	5/6	1/6	5/6	...
Total loss	5/6	5/6	0	0	1/6	1/6
Final cons. H Cl.....	9 1/6		10		9 5/6	

When ions have equal velocities, the ratio will be as 1:1, and the changes in concentration at anode and cathode will be the same. The above relation of the ratio of H^+ to Cl^- is found to be true as velocity of H^+ ion is 0.00329 cm. per second under a potential gradient of one volt, while that of the Cl^- ion is 0.00058 cm. per second or 1/5 (approximately) that of the H^+ ion. Therefore, if the velocity of the ions are known, the ratio of the loss of anode section to cathode section can be predicted.

A method for determining the velocity of ions is due to Lodge. A tube is filled with jelly, made up of gelatine and water containing NaCl and a little phenolphthalein One end of the tube is placed in contact with a solution of HCl, and a current is passed in from platinum electrode so that it flows from HCl to the NaCl. Fig. 2.

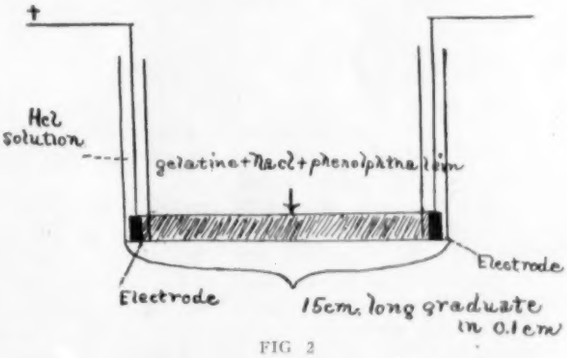


FIG 2

The current causes H^+ ions to move toward the negative electrode, through the gelatine and as they proceed, decolorize the phenolphthalein. This makes the movement of the ions visible, so that the velocity can be measured by direct observation. The time taken for the gelatine to be discolored to just left of the negative electrode divided into the distance between the electrodes will give the velocity in cm. per second. It must be remembered that no single ion produced the discoloration of the phenolphthalein, but a multitude of H^+ ions. Since, however, all the H^+ ions started from the same point, and all must travel at the same speed, the result is the same as if only one ion were present. Lodge found the velocity of H^+ ion to be from 0.0024 to 0.0029 cm. per second under a potential gradient of one volt. Better and later results give the velocity of H^+ ion to be 0.00329 cms. per second.

Lodge's method has been modified by Orme Masson, so as to make the method available for a larger amount

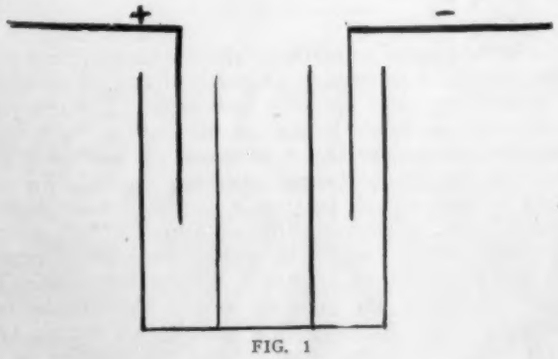


FIG. 1

of substances. His apparatus consisted of a horizontal tube 15 cm. long, 2 mm. wide between two flasks with side tubes. The tube is filled with a jelly of the material to be studied—Na Cl the jelly of agar-agar, 12% and contains enough salt to make a normal solution. The flasks containing the two indicating solutions and platinum electrodes are placed just opposite the endings of the tube.

The anode solution is $NCuSO_4$ and the cathode solution contains 1/9 equivalent $K_2 Cr_2O_7$ + 8/9 equivalents $K_2 CrO_4$. A potential of 40 volts is applied and the apparatus is kept in ice water as a large amount of heat is developed. Fig. 3.

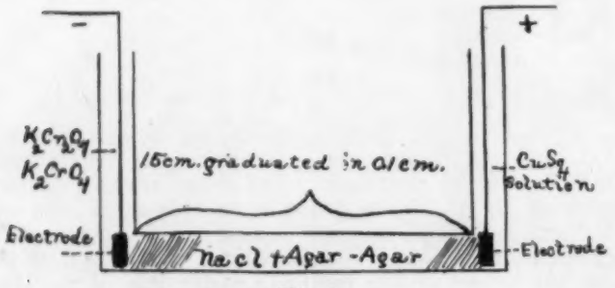


FIG. 3

Na^+ ions move along the tube toward the cathode and the Cu^+ ions follow them turning the jelly blue. The Cl^- ions move toward the anode and the bichromatic and chromate ions follow turning the jelly yellow. The time of passage of colored boundaries past each half centimeter are noted. The Na^+ and Cl^- ions being together in the same part of the tube are subjected to the same potential or gradient, and their mobilities will be strictly in the same ratio as the velocity with which they move. That these velocities are measured by the movement of the colored particles can be determined by chemical analysis of the colored jellies which will show that all Na^+ ions have disappeared from blue colored jelly and the Cl^- ions have disappeared from yellow colored jelly. This method is applicable to all ions that move faster than copper and chromate ions.

The following facts should be remembered about the velocity of migration of ions. Ions move at different velocities and the velocities are very small. The velocity of migration is independent of the current, but depends upon the electrical force acting on the ions. The velocity depends upon the concentration of the solution. When concentrated solutions are diluted, a point is reached beyond which further dilution causes no appreciable change in velocity. This is due to the fact that in concentrated solutions, there are a large number of undissociated molecules which offer a large resistance to the motion of the ions. As dilution is increased, this influence becomes less, due to increase in conization, so that resistance offered to ions becomes less. Temperatures increase the velocity of ions.

Concentration Changes in Plating Solutions

A glance over the reactions occurring at electrodes in plating solutions, shows that metal ions are formed at the anode area, and free cyanide or free acid at the cathode area. Both of these are formed at places where they are not required. The metal is needed at the cathode area and the free cyanide or acid at the anode area. These facts show why so much better results are obtained in agitated and heated solutions, when we remember the same velocity with which ions travel. Agitation and heating offer mechanical means of bringing those substances to those places where they will be of the most advantage.

Specific Equivalent and Molecular Conductance

The power of a solution to carry an electric current is called its conductance. The conductance is represented by the symbol K. There is no way of directly measuring or determining the conductance. The resistance (R) expressed in ohms, has first to be determined, and the conductance is the reciprocal of the resistance, that is

$$K = \frac{1}{R}$$ (expressing K in reciprocal ohms or mhos.)

There are several factors influencing conductance and a change in any of them changes the conductance. Increasing temperature, pressure, number or cross section of electrodes, concentration of ions, increase conduction. Diminishing the distance between electrodes increases conduction. The chemical nature of the solute and of the solvent also greatly influence conduction. In the case of solutions, the conductance does not depend on the whole material between the electrodes, but only on the amount of the solute. When we wish, therefore, to compare different substances with respect to the conductance they exhibit in solution, we must compare chemically comparable quantities, as the equivalent or the molecular quantities. In this way, the terms equivalent and molecular (molar) conductance have been obtained.

The resistance of metals are compared to each other by determining the resistance of a specified length and cross section. The length chosen has been 1 centimeter (cm.) and the cross section 1 square centimeter (sq. cm.), so that the unit for comparing resistance is a cube. The resistance is therefore expressed in ohms per cubic centimeter ($cm.^3$). The cube may also be of 1 inch edge, when resistance would be expressed in ohms per inch cube. The resistance of this cube (either the $cm.^3$ or $inch^3$) is called the specific resistance or resistivity and is denoted by the symbol R. The reciprocal of this is called the specific conductance or conductivity and is denoted by the symbol K. If a conductor is of any other dimensions but the cube, R, is obtained from the following formula:

$$R = R \times \frac{a}{l}$$

R = specific resistance in ohms
R = Total resistance in ohms
a = area of cross section in square cm. or square inches depending on whether *R* is to be expressed in ohms per $cm.^3$ or ohms per $in.^3$.
l = length in centimeters or inches

If the specific resistance is known and it is desired to know the total resistance the formula is:

$$R = R \times \frac{l}{a}$$

So in the case of solutions of electrotypes either a gram equivalent or a molecular weight is dissolved in a cube of water either of 1 cm. or 1 inch edge. The resistance of this solution would be the specific resistance for either equivalent or molecular conductance. It can readily be seen that to obtain the specific resistance in this way would be impractical, because it would be impossible to dissolve such a large quantity of solute in such a small amount of water. But the theoretical facts must be taken into consideration to arrive at certain formulas. The vessel containing the solution would have to be constructed of two non-corroding metallic electrodes (Pt) which would be 1 cm. apart. Since the solution in the

vessel is of one square centimeter (1 sq. cm.) cross section and its volume is one cubic centimeter (c.c.) its resistance when determined is the specific resistence R. The reciprocal of this would be the specific conductance K. Knowing the specific conductance of a substance, as for instance $CuSO_4$, if it is desired to know the equivalent conductance at any other volume, as 1500 s.s. (number of c.c. represented by n), K would be multiplied by that volume. The equation:

$$E.K. = K \times n$$

E. K. represents equivalent conductance.
K. represents specific conductance.
n represents volume in c.c.

Substituting we would have

$$E.K._{1500}^{CuSO_4} = K \times 1500.$$

which should be read that the equivalent conductance of $CuSO_4$ solution at a dilution of 1500 c.c. is equal to the specific conductance multiplied by 1500 c.c.

If in the cubic centimeter, that had its resistance determined, there had been a molar weight of an electrolyte then R would be the specific resistance of a molar weight of the electrolyte whose specific conductance would $\frac{1}{R}$ or K. At any other volume the molecular conductance would be expressed by the equation: $M.K. = K \times n$.

The value of the specific conductance is gotten practically in a much easier way. Using a vessel of 1 litre capacity whose sides serving as electrodes are 1 cm. apart; a litre, containing a gram equivalent of an electrolyte, has its resistance determined. Since the section of this solution is 1000 sq. cm., the conductance of this solution will be 1000 times that of a cube of the same solution with only 1 cm. edge. The resistance of this solution could be measured by the Kohlrausch method, which will be described later. The resistance of this solution would be equivalent resistance, denoted by E. R. and equivalent conductance, E. K. would be:

$$E.K. = \frac{1}{E.R.}$$

Then substituting value of E. K. in equation $E.K. = K \times n$ and solving we would get that $K = \frac{E.K.}{1000}$

The specific conductance for molecular conductance would be obtained by having a litre solution of a gram molecular weight of an electrolyte in the above vessel. The molecular resistance of this solution would be denoted by M. R. and from that we would obtain that:

$$M.K. = \frac{1}{M.R.}$$

and since $M.K. = K \times n$, then $K = \frac{M.K.}{1000}$.

Effect of Temperature on Conductance, Temperature and Coefficient of Conductance

Temperature has an important effect on the conductance of electrolytes. In most cases, the conductivity increases as temperature increases. It has been found that the change in conductance of a solution is almost linear and may be expressed with a fair degree of accuracy by the following formula. In the case of equivalent solutions:

$$\triangle E.K., 1° = \frac{1}{E.K._{0}} \times \frac{E.K._{2} - E.K._{1}}{t_2 - t_1}$$

In this equation $E.K._1$ and $E.K._2$ are conductances at temperatures t_1 and t_2 respectively. $\triangle$ E. K., 1° is called the temperature coefficient and gives the change of conductance, expressed as a fraction of the conductance, $E.K._0$, at a given temperature for a change in temperature, of one degree. 18° has been chosen as the given temperature, so that above equation takes the form:

$$\triangle E.K., 1° = \frac{1}{E.K._{18}} \times \frac{E.K._{2} - E.K._{1}}{t_2 - t_1}$$

Accurate measurements have shown that a change of one degree changes the value of conductance from 1 to 2½ per cent.

Relative Conductance of Electrolytes and the Effect of Dilution on Conductance

Solutions of electrolytes, as regards conductance are primarily divided into two classes. Those of high conductance, as strong acids, bases and salts and those of low conductance, as organic acids and bases. Since the passage of a current through an electrolyte consists in the transfer of electricity by material particles, the ions, and since according to the ionization theory only the ionized portion can carry the current at any moment, a given weight of an electrolyte, as an equivalent or molar weight should under comparable conditions be more efficient a conductor, the more completely it is ionized. If the conductance of a given weight of HCl is measured under comparable conditions, it should be found that the more completely it is ionized, the greater will be the conductance.

Since an aqueous solution of HCl ionizes under the influence of the solvent water, theory would lead us to suspect that the greater the proportion of the water used, the greater will be the ionization and consequently the conductance. Experiment has shown this to be so. A simple experiment can be made to illustrate this point. Take an electrolytic cell of one litre capacity and fit it up with two electrodes from top to bottom of the cell; connect with ammeter and source of current. First fill with water. No appreciable amount of current will be shown on the ammeter. Empty the cell and add 20 c.c. of a 4 molar HCl solution. The ammeter will show a definite current passing through the solution. In this particular case, with cell 4.6 cm. wide and 11.5 cm. long, and with copper electrodes 4.6 cm. broad, and 21 cm. high, the amperage shown on the ammeter was 0.17. The conductance of a solution being the reciprocal of the resistance and since according to Ohm's law, the current for a given potential is inversely proportional to the resistance the current is directly proportional to the conductance. $I = \frac{E}{R}$ or $I = E \times \frac{1}{R} = E \times$ conductance.

Therefore for a constant P. D., I = conductance. The resistance of the metal connections, and ammeter being small compared with resistance of the solution, may be ignored. Thus current indicated by the ammeted may be considered as fairly representing the conductance of the solution.

If 20 c.c. of water are added to the cell, the cross section through which the current has to flow from electrode to electrode will be doubled, and since the conductance of any of a liquid conductor like that of any metal conductor increases proportionally to the cross section, the current should be doubled by this factor alone. But, on the other

hand, the concentration of the acid is now only one-half of its original concentration.

Consequently, if there was no further change in the electrolyte, the original conductance would be maintained when the acid is diluted to ½. But, according to the ionization theory, the addition of water to a given weight of H Cl should increase the proportion of ionized acid, and since the ions are the carriers of the current, the conductance of the solution should increase because of this change in the composition of the electrolyte. Experiment has also shown this to be true. 20 c.c. H_2O + 20 c.c. 4 molar H Cl in cell are added and mixture stirred.

The current is passed through the solution and the ammeter shows an increase from 0.17 to 0.22 amperes. If 40, 80, 160 and 320 c.c. H_2O are added successively, the ammeter shows an increase with each addition of water. But while each addition dilutes acid to ½ of its former concentration, the increase in conductance grows proportionally smaller with each dilution.

Concentration of Acid.	Observed Conductance.
4 molar	0.17
2 molar	0.22
1 molar	0.26
½ molar	0.30
¼ molar	0.31
⅛ molar	0.32

Furthermore, we would suspect that since the increase in conductance was dependent upon increase in ionization, and definite quantity of an electrolyte would tend toward a limited or maximum conductance, when all the electrolyte had become dissociated. Such is really the case. The electrolyte is said to be completely dissociated, and the conductance at complete dissociation is called the maximum conductance. The dilution at complete dissociation is called infinite dilution and is represented by the symbol S K ∞ + D ∞ respectively. The experiment and the essential facts brought out under this heading have been taken from "Qualitative Analytical Chemistry" by Stieglitz.

BARREL PLATING.

The popularity of the plating barrel has grown rapidly since its introduction, owing to the fact that most of the small articles, which were previously plated in the ordinary still vat, can be treated with much more advantage by the barrel plating process. The chief points in its favor are that it does away with the troublesome wiring up of each article, thereby effecting great saving of time and material; the deposit is of uniform thickness owing to the continuous movement of the articles caused by the rotation of the barrel; and finally, the articles leave the barrel in a bright polished condition, making the finishing after plating practically superfluous. It consists of a vat containing the plating solution, and across the vat there is a shaft to which is fixed two arms carrying the plating barrel, by means of a spindle with a chain wheel at one end, and revolved by means of a chain and chain wheel at the other, and which is connected to the belt pulley running on the shaft. The latter is rotated by means of a worm and worm wheel, thereby bringing the barrel out of the vat when necessary.

ELECTRIC FURNACE DEVELOPMENTS FOR METALS

A Description of a New Device Just Being Brought Out in England

The most efficient method for melting a metal is obviously to generate the requisite heat in the metal itself, which happens, for example, when a sufficiently large electric current passes through it. When the metal is a very good conductor, such as copper or brass, the current needed for this direct method is, however, very large indeed, and difficulties, due to local contraction of the liquid metal, may arise in consequence. The next best procedure is to produce the heat directly in the crucible wall, and the crucibles described below act in this way, the new feature of the Morgan crucible being that the crucible is the container and also the conductor to be heated. These improvements are the result of experiments lasting over 20 years, and they were on the point of completion at the outbreak of war, this deferring the production of the present resulting types until just recently.

In addition to the ordinary refractory composition, the crucible wall contains graphite, with any other necessary material to make it reasonably conducting, the top and bottom being specially shaped, and each fitted with a metal clamp, which is kept cool by a steady stream of water flowing through a space inside it, and to these metal clamps the flexible wires leading the current in and out from the mains are attached. In the upright form, capable of melting, say, up to 200 lb. of brass, the crucible is smaller at the bottom than the top, hence if the walls were uniformly thick, and if the material were the same everywhere, the resistance would increase towards the bottom, and the temperature of the crucible wall would increase downwards. This can be prevented by thickening the walls towards the bottom, or, if desired, by varying the constituents of the wall from top to bottom. Further technical details are given later. The temperature of the crucible wall is controlled by varying the current, and a fine adjustment of the resistance is provided by means of the clamp securing the water-cooled terminals to the crucible, a small adjustment of the screw of the clamp making the necessary change.

The crucible is fitted with a very thin layer of insulation, and then with a refractory non-conducting lining, and thus the metal itself does not short-circuit the current from the crucible wall.

Since the crucible itself serves as the conductor having resistance through which the electric current is passed, it is so designed that the maximum heating effect is produced only in the zone where actually required.

Fig. 1 shows the vertical crucible type, which can be arranged for use with either continuous current, single phase alternating current, or for one phase of a three-phase A.C. circuit, and it will melt up to about 200 lb. of brass. The current taken is approximately 1,000 amperes at a voltage varying between 20 and 40. The plant is arranged to tilt about a centre, the body, which is not shown in the diagram, being constructed of a cylindrical steel casing bolted to cast iron top and bottom rings, supported on centre trunnions, to one of which is fitted a worm-wheel engaged with a worm, and the tilting gear is operated by means of the hand wheel. Machine-cut steel bevel wheels are arranged in the tilting gear, thus making it an easy matter to control the pour. The side cast-iron stand-

ards are of a strong ribbed section, bored to receive the trunnions, and securely bolted down to a cast-iron base plate.

Patent water-cooled terminals, which make direct contact with extensions to the top and the base of the crucible respectively, are made of gunmetal, machined on the inside, and are in two halves, hinged together, and provided with tightening bolts to ensure perfect contact. Special refractory insulating bricks are employed. These have a specific gravity of less than 0.9, and absorb extremely little heat, making excellent heat insulators in consequence.

The bottom water-cooled terminal is supported by a cone-pointed pin fixed vertically in the centre of a sling hanger carried from the bottom plate. By this means any variation which might possibly occur in the vertical alignment of the crucible is automatically adjusted. The top water-cooled terminal is maintained central and steady by means of two arms, bored and fitted with steadying spiral springs, which slide on vertical guide-rods with adjusting nuts attached to the plant. The arms are insulated from the terminal.

A slate or hard timber terminal board is rigidly fixed to one of the standards, and is fitted with thimbles for taking the supply cables. Suitable flexible leads connecting the board to the water-cooled terminals are supplied with the plant. A similar arrangement is provided for the water-cooling pipes.

The top extension of the crucible forms a convenient charging hopper for metal, and is provided with a special refractory cover. A drain spout is fixed at the front of the plant as a safety outlet for the metal should a crucible fail. The interior of the plant comprises a thickness of insulating material entirely covering the steel casing, and a Battersea Triangle (△) Brand Refractory Sectional Lining.

The small space between the lining and the crucible is filled with suitable refractory and non-conducting material.

The voltage required for the crucibles is much below that available from town supply mains, and since any required low pressure is very easily obtained by transformers, it is, on the whole, more convenient to have access to alternating current mains, and the Morgan Crucible Company supply transformers with the crucibles to suit any desired A.C. system. The vertical type of crucible, so far described, is made in two sizes, one for 20 pound charge, and the other for about 150 to 200 pounds.

A modified form suitable for larger charges up to ½ ton is shown in Figs. 2 and 3. Fig. 2 shows the crucible itself with alternative methods for attaching the water-cooled metal terminals, and Fig. 3 shows sectional side and end elevations of the complete plant.

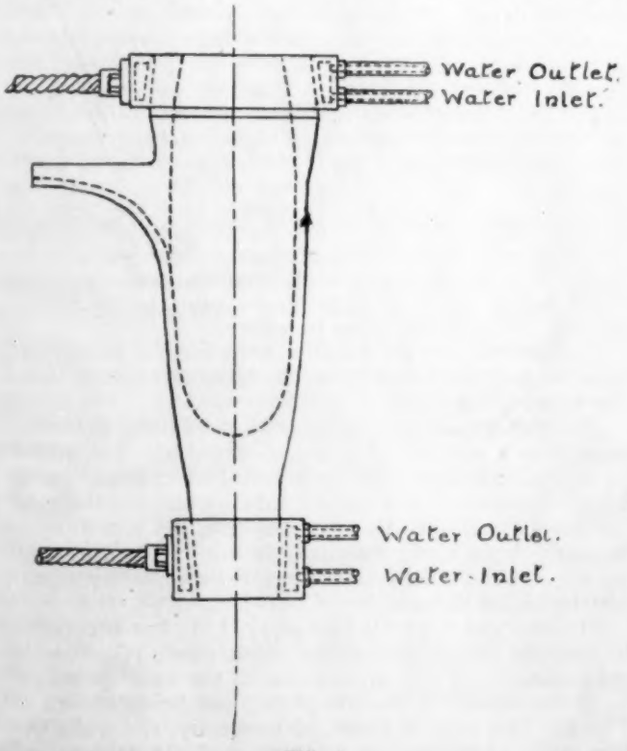


FIG. 1

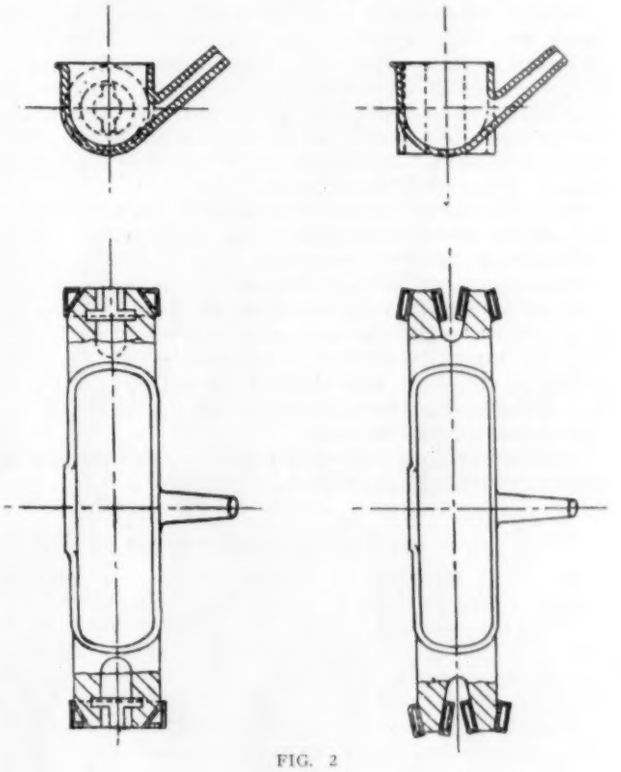


FIG. 2

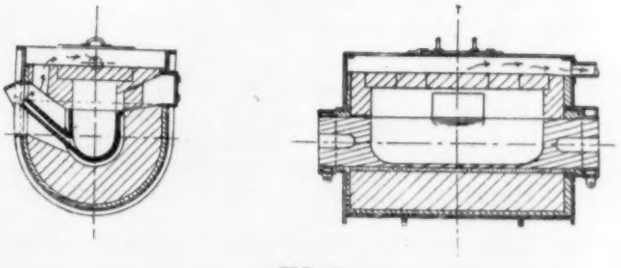


FIG. 3

In this larger pattern the axis is horizontal, and the crucible is a long pan open at the top, and at both ends there are extensions, to which the water-cooled terminals are attached. The current thus flows through the crucible wall from one extension to the other, heating the pan and melting the charge contained in it.

A pouring spout is fitted in the centre of the pan, and this can be separately heated if desired, so that no cooling need take place during pouring. The crucible is surrounded, as is seen in the diagram, by special insulating material, and then by light refractory bricks, the whole being contained in a metal shell. The metal

shell or casing is supported on rollers, which permit rotation for pouring, the axis of rotation being the centre line through the extension pieces, to which the terminals are attached.

When in action the top of the crucible is also covered with light refractory bricks, and the metal shell over the top has a suitable removable cover. A suction pipe is fitted to the space between the brick lining and the metal shell, so that an electric fan can draw away all the fumes from the crucible top when both the refractory brick cover and the metal lid are opened for inspection, adding fresh charge, or for stirring. The fan is only put into operation just when the opening is to take place, and thus the operation of the furnace becomes perfectly hygienic, and fresh charge can be added to the crucible contents with a glove-protected hand with no more trouble than is involved in an ordinary cooking operation. Large ingots or sheets of scrap are easily added to the charge. After the crucible is once heated up there are very small heat losses, and the current can be turned off before pouring commences. A charge of ½ ton of brass can be melted thoroughly down in two hours.

Since the entire control is by switches and the clamping screw above mentioned, the temperature being determined either by electrical or optical pyrometers, the management of the furnace is extremely simple, and one man can do the whole work of three furnaces. It is obvious that the surface of the metal in such a crucible is not liable to be over-heated, and since the whole is enclosed, any desired atmosphere, such as an inert gas, can be retained above the metal if advisable for special reasons.

From what goes before it will be seen that any of these patent electrically-heated crucibles will be satisfactory with either direct or alternating current, the advantage of the latter being that the pressures can be so easily adjusted to the required low values.

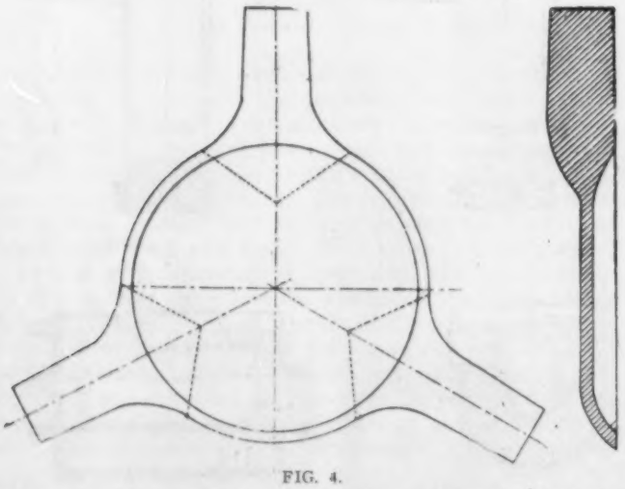


FIG. 4.

For three-phase systems, the plan recommended is to use a crucible in each phase, and to keep one in reserve.

For three-phase connection only, a special pattern of crucible is made. This is shown in Fig. 4, and it was also seen in operation at the Battersea works. It consists of a shallow pan crucible, like a deep soup plate, having three arms projecting from it at 120 deg. apart, and to these the three water-cooled line terminals are attached, the centre of the pan thus forming the neutral point of a star-connected system. The material of the pan or crucible is the same mixture as that forming the other patent crucibles. The pan becomes intensely heated by the current flow between the centre and the connecting lugs, and the whole forms a most simple type of crucible.

The Morgan Crucible Company, Ltd., are continuing developments with their pattern with a view to its use in open-hearth steel melting.

DETAILS OF TESTS.

The following notes of tests carried out and difficulties met with and overcome at the Battersea works of the Morgan Crucible Company are of interest:—In a trial melting of 65/35 brass for strip castings the charge consisted of 2/3 webbing and 1/3 virgin metal, the zinc part of the virgin metal being put in at the end of the charge.

800 pounds of metal was put into the charge, and there was a loss of only ½ per cent. Even this small loss would have been largely obviated had proper pouring appliances been available for the trial run. The time taken for the melt was approximately two hours, and the total units consumed were 120, giving

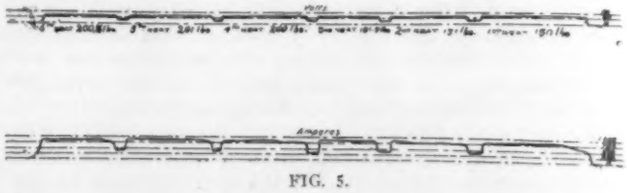


FIG. 5.

a consumption of 15 units per 100 lb. of metal. This trial was the second heat of the day, and lower figures can be obtained in subsequent heats, as it takes two or three heats for the furnace to reach its maximum melting efficiency.

An automatically recorded load-curve is instructive, and the steadiness of the load is seen by studying Fig. 5, which is taken from an actual recorder chart. The paper was moved steadily at the rate of 3 in. per hour, and the details of the melts are marked on the chart.

Various classes of metal have been melted in the crucible furnace, including steel boiler punchings, but for the present the Morgan Crucible Company, Ltd., is not in a position to supply commercially crucibles suitable for metals requiring a higher melting temperature than 1,300 deg. C., but they hope to do so at an early date.

ELECTRICALLY HEATED MUFFLES, TUBES, AND RETORTS.

The power of obtaining a chamber of which the interior is of a uniformly high temperature, say up to 1,300 deg. C. or so, is of immense value to the metallurgist, and in many other industries.

These chambers are usually in the form of tubes, but have been hitherto made on the laboratory scale only, the tubes being small.

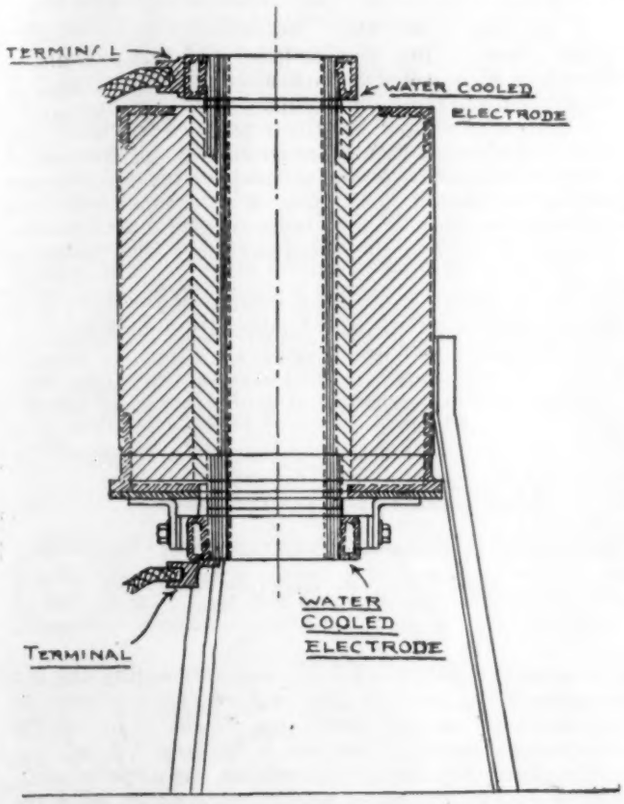
A common form is a tube of refractory material, heated by a wire spiral wrapped round it or embedded in it, and another form is a spiral of carbon, which may be made out of a carbon tube by putting the tube on a mandrel, cutting a square-threaded screw upon is nearly down to the mandrel, but not quite, and, lastly, boring out the hole a little larger to completely separate the screw threads.

The Morgan Crucible Company, Ltd., has succeeded in making these tube muffles on a much larger scale than formerly by an application of the same principle as in the crucibles, the complete plant being shown in Fig. 6. The tube is arranged vertically, the walls being made of the patent mixture, and the current led

through it from end to end, connections being made to the external circuit by water-cooled terminals as before.

The tube is surrounded by insulating material, and this again by refactory bricks, the whole being in a metal casing.

In one which is in constant use at Battersea the tube



is 8 in. inside diameter, and 40 in. long, 24 in. being the heat zone, the temperature throughout the interior space being about 1,350 deg. C. The atmosphere inside the tube can be of any gas desired, an inert gas, such as nitrogen, for example, or a vacuum can be maintained if necessary. Hence heat treatment can be applied to metal articles without any chemical action resulting, and as an illustration the annealing of bright brass strip is a simple matter. Metal melting and refining can obviously be carried out in the hot chamber thus provided without any chance of contamination.

The temperature is most easily controlled by switches, the operation demanding no great skill.

ADVANTAGES OF THE ELECTRICALLY-HEATED CRUCIBLE.

1. Where electric energy is cheap the running costs are very low. The consumption averages 15 units per 100 lb. of brass, hence if energy costs 1d. per unit the cost per 100 lb. melted is 1s. 3d.
2. There are no carbon electrodes to keep in order and replace.
3. The crucible is completely protected from mechanical damage, and thus the life is long.
4. The labor charges are a minimum, since the control is so simple, and no electrode feeding has to be done.
5. The hygienic conditions are as good as they could possibly be.
6. Since the crucible is covered, the losses by oxidization and volatilization are a minimum.
7. There is no contamination of the charge.
8. Any chemical action, from the lining, if desired, can be produced by fitting the requisite lining just as in ordinary crucibles.
9. The metal is poured from the bottom, and is always clean.
10. No metal need be left in the crucible to start the circuit.
11. It is simple to install, neither foundation nor chimney being necessary.
12. The heat insulation of the plant is so good that there are no large losses of heat, and therefore the efficiency is high.
13. The voltage being so low, there is no danger whatever of electric shock.
14. The size of the plant is small, since there is no outer furnace for the combustion of oil, coke, or gas. Neither is any space taken up in the foundry for the storage of oil, coke, or gas.

The detailed patents taken out by the Morgan Crucible Company, Ltd., for electrical melting units cover one for an ordinary shaped crucible, one for a trough-shaped crucible, one for a three-phase hearth, one for means of heating the pouring spout, and one for means of regulating the voltage across the crucible by adjusting the resistance at the water-cooled terminal.

On our recent visit we were also given the opportunity of examining the large muffle furnaces in which the plumbago crucibles are treated. These consist of ferro-concrete outer walls, with inner linings and partitions of the light refractory bricks mentioned earlier.

In 1897 crucibles fitted like those shown in Fig. 1 but without the water-cooling device were experimented with at Randolph and Clowes Company at Waterbury, Conn. They were made by Ritter-Conley Company of Scranton, Pa., Owing to the high cost of electricity they were not used.

SOLDERING ALUMINUM

The surfaces of two pieces of aluminum to be soldered together should be rubbed down with emery paper with a small quantity of vaseline, according to the REVUE GÉNÉRALE DE L'ELECTRICITÉ. The flux may be made up as follows, according to a prescription given by the Soldering Association: Lithium chloride, 15 per cent; potassium chloride, 45 per cent; sodium chloride, 30 per cent; potassium fluoride, 7 per cent; bisulphate of soda, 3 per cent. The joint should be carefully brushed and washed in hot water to remove all traces of the flux.

DUTY ON TUNGSTEN

The House passed the first after-the-war tariff bill, in pursuance of the Republican program to protect American industry from German post-war competition, when the bill placing a high duty on tungsten was passed by a vote of 171 to 132.

The bill as passed provides these new custom duties:

"First, crude tungsten ores and concentrates, $10 per unit of tungsten trioxide therein contained, a unit being herein defined as 1 per centum of a short ton of 2,000 pounds, namely, twenty pounds of tungstic trioxide.

"Second, metallic tungsten, tungsten powder, ferro tungsten (lump and pulverized), ferro tungsten powder, commercial tungstic acid, calcium tungstate, sodium tungstate and all other salts of tungsten and other manufactured materials containing tungsten, including high-speed tungsten steel, all alloy steel containing tungsten, and all other compounds containing tungsten not specifically provided for in this section, $1 per pound of tungsten contained therein."

There is no tariff at present on tungsten.

EDITORIAL

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CONTENTS

THE MONEY VALUE OF SAFETY

A startling example of the business value of safeguards is given by the National Safety Council. In the plant of the American Rolling Mills Company, in Middletown, Ohio, during the first five months of 1919, it was shown by the report of R. G. Adair, Safety Engineer, that there had been a reduction of 91.9% in the total compensation paid by the company during the period mentioned, a reduction of 46% in the total number of lost time accidents and the reduction of 51% in the total days lost as a result of accidents.

This is shown even more clearly in the tabulation below, which gives the total outlays in money for compensation of accidents.

Five Months	Total Compensation	Compensation per 100 Men	Per cent of Reduction
1918	$20,638.22	$412.76	
1919	1,340.26	38.29	91.9
	Total Lost Time Accidents	Lost Time Accidents per 100 Men	
1918	210	4.2	
1919	83	2.3	46
	Total Days Lost	Days Lost per 100 Men	
1918	2,523	50.4	
1919	868	24.8	51

A novel and effective way of counteracting the hot weather inclination on the part of the workmen to discard goggles was developed in the plant of the Aluminum Castings Company, Cleveland, Ohio.

This company found that on hot days many workmen were tempted to lay aside their goggles when the lenses became steamy or cloudy from perspiration. To prevent this the firm gave the men neat wiping cloths about 4 by 6 inches, which could be conveniently carried in the goggle case. Each cloth carried the printed message, "Use this cloth to wipe your goggles clean," and also a safety slogan, of which the following are examples:

"Goggles save your eyes."

"Goggles are to protect your eyes, not your cap."

"You can't see with a glass eye. Wear your goggles today."

"Take care of your eyes. Your goggles will do it."

"What would you take for your eyes. Think it over."

THE FOUNDRYMEN'S CONVENTION

The leading article in this issue will give all the details of the coming convention of the American Foundrymen's Association, together with the meeting of the Institute of Metals Division. There is plainly no need to urge everybody connected with the metal industries to attend, for the convention speaks too plainly for itself. It is to be held at the Commercial Museum, Philadelphia, and in addition to the joint meetings of the above mentioned societies, there will be the annual exhibition of foundry equipment and supplies; the largest exhibition of foundry machinery ever held. Make it your business to attend.

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

METALLURGICAL FURNACES

To the Editor of THE METAL INDUSTRY:

Although no questions have as yet been raised, it would be well to note with regard to my article in the issue of August, 1919, on Metallurgical Calculations that for the sake of practical considerations one element was omitted, in consideration and calculation of the necessary heat to melt a specific amount of copper.

This particular element was the latent heat of fusion. To be strictly correct and scientific this should be taken into consideration in working conditions. However, as sufficient leeway and allowance for practical loss has been made, this can be omitted without affecting the practical results of the installation. For example, the latent heat of fusion of copper is about 180 B. T. U. Referring back to the article in question this would add 360,000 B. T. U. to the total already figured to raise copper to the temperature desired. Nevertheless, when the average furnace efficiency is figured and the proper allowance made the correct results obtained are the same as those arrived at in the original calculation, namely, from 2 to 2½ gallons of oil per hundred pounds.

This letter is written simply to make clear the omission of the figures for the latent heat of fusion, and not with any intention of changing the results reached.

As most foundrymen know, 2½ gallons of oil per hundred pounds of metal is the general allowance made for most installations.

ADOLPH BREGMAN.

NEW BOOK

Metal Workers' Handbook of Receipts and Processes, by Wm. T. Brannt, size 5½ x 7½, 590 pages, 82 illustrations, cloth binding, price payable in advance $3, published by Henry Carey Baird & Co., for sale by THE METAL INDUSTRY.

This is an excellent book, ambitious in its purpose, and covering its tremendous field, with a surprising amount of detail.

It would pay almost anyone to keep this volume for reference, for there are very few problems in metal working that are not taken up. Brannt is already known as an author and translator of high repute, and anything that comes from his pen is well worth reading.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

CASTING

Q.—We are making tube heads of a composition of 85 per cent copper. 13 per cent zinc and 2 per cent nickel. These tube heads are subjected to 4,500 pounds' hydraulic pressure, after which they are bored out and a lot of copper tubes brazed in them. We have a great deal of trouble in getting these castings solid and free from shrinkage cracks. We would like to know if the nickel is beneficial in this mixture. What other mixture would stand the necessary requirements. In soldering the copper pipes into the tube heads, hard solder or silver solder is used. It is thought that the nickel prevents the tubes from burning.

A.—A satisfactory mixture for castings that are to be brazed with hard solder is copper 80 and zinc 20. This alloy is known in many brass foundries as "brazen" metal. The hard solder in most general use is composed of copper 50 and zinc 50, so that the difference in melting point between the two alloys is sufficient to enable satisfactory brazing results to be obtained. In fact hard soldering can be done on alloys much below the 80 copper and 20 zinc alloy, in melting point. The increase in melting point due to the addition of 2 per cent nickel is not very great, and it is more than counterbalanced by the fact that all alloys containing nickel are hard to braze because of the coating of nickel oxide on them. The nickel also makes the metal sluggish when molten, so that it has to be overheated for pouring, thus rendering shrinkage cracks-like and increasing the difficulty of obtaining solid castings.

Hydraulic metal (copper 100, tin 10, sheet or tube yellow brass 25) cast into ingots and remelted, gives very good results in castings that must stand hydraulic pressure. A skilled mechanic would have no difficulty in brazing copper tubes into tube heads made from this mixture, using ordinary brazing solder. Silver solder seems to be the most satisfactory alloy for brazing nickel alloys. Silver solder, however, is very expensive, and if the nickel is omitted from your mixture it ought not to be necessary.

The efficiency of 2 per cent of nickel in preventing tubes from burning is questionable, although the ability of pure nickel and alloys high in nickel, to withstand high temperatures, is well known.—J. L. J. Problem 2,728.

Q.—I shall be glad if you will give me particulars of a manganese bronze of high strength (40 tons tensile), as I have difficulty in getting uniform results. Could you refer me to any publications likely to be helpful?

A.—There is not much information in technical literature concerning the manufacture of manganese brass. An article was published in THE METAL INDUSTRY, October, 1912.

The compositions which will give the high tensile strength required are variable, but the following may be taken as a guide, viz.:

Copper	58 per cent.
Aluminum	.5 to 1.5 per cent.
Manganese	1.5 to 2.0 per cent.
Iron	.5 to 1.5 per cent.
Tin	.5 (max.)
Lead	nil

The addition of tin is not to be recommended if the percentage of elongation specified is above 15 per cent. Manganese and iron must be added as special alloys—made, say, from ferro-manganese and copper. These special alloys may be bought from firms specializing in their manufacture. It is inadvisable to attempt to introduce metallic iron direct into the alloy.—W. T. F. Problem 2,729.

Q.—I have a manganese bronze to make to give an ultimate strength of 29 tons per square inch, and a 15 per cent. elongation in 2 inch minimum. I have been recommended to try the following mixture Cu 50 pounds, Zn 44 pounds, manganese copper containing 30 per cent. manganese 5 pounds, Sn ½ pound, and Al ½ pound. Do you think this will give the required tests? If not, can you suggest a mixture that will, and the best method of mixing. Also, could you give me the mixture for a cheap commercial gun-metal suitable for bushes, etc.?

A.—It is quite unlikely that you will be able to obtain sand-castings from the mixture you mention to meet the specification quoted. It is, however, a simple mixture to make. Much will depend upon the loss of zinc in melting. Apparently the mixture is made so that the usual loss of spelter will bring the copper contents to about 55 per cent. As against this the aluminum will make the alloy equivalent in properties to a brass of 52 per cent.

copper. The tin will have the effect of raising the yield point and lowering the elongation and the manganese will tend to rectify the brittleness of the alloy. Try this alloy first. If, however, it does not succeed, try the following:—

Copper	58 pounds
Aluminium	1½ pounds
Cupro Manganese	2 pounds
Iron	1½ pounds
Lead	nil
Tin	nil

Always pour into ingots and remelt ingots for making castings.

Melt copper first and add cupro manganese, then 15 pounds of ferrozinc (containing 10 per cent. iron) then the remainder of the zinc (22 pounds) then the aluminium. The stirring must be very thorough indeed and the skimming clean. Use graphite pots and an ample covering of charcoal.

Some cheap mixtures for gun-metal bushes are as follows:

Copper	Tin	Zinc	Lead
87	6	5	2
85	5	5	5
80	5	—	15

—W. T. F. Problem 2,730.

DIPPING

Q.—Can you give us a formula for a dip solution that can be used to produce a black finish on brass? We desire a blacker finish than the one produced by using 1 gallon of aqua ammonia, 2 ounces of sal soda and ½ pound of carbonate of copper. We know that there is such a solution being used.

A.—If there is a dip solution that will produce a blacker finish than the ammonia carbonate of copper dip you are now using, we are not familiar with it. Any other type of a dip solution will produce a gray tone.

A solution composed of the following materials and used as a regular plating solution with nickel anodes, will give a deep black finish if the voltage does not exceed ½ to 1 volt.

Water	1 gallon
Double nickel salts	8 ounces
Sodium sulpho-cyanide	3 ounces
Copper sulphate	1 ounce
Water ammonia	¼ ounce

—C. H. P. Problem 2,731.

GILDING

Q.—I am having considerable trouble in gilding small brass safety pins. I am unable to get the very bright lustre on my work which is required for this class of goods. I am using a dip of aqua fortis—half by measure and water, and a small quantity of sulphuric acid for the first dip, and then into a clear aqua fortis dip. The gilding solution is as follows:—

Water	1 gallon
Cyanide	5 ozs.
Chloride of gold	10 dwts.
Bisulphite of soda	1 oz.

A.—There is, apparently, too much deposit on the work. Reduce either current or time of immersion. There is no reason for using bisulphite of soda, as you can get a fine burnish on the goods by wet-burnishing in a barrel after gilding. Of course, acid dipping gives a lustrous matte appearance.—C. W. H. Problem 2,732.

OXIDIZING

Q.—Is there any chemical we can use in place of sulphuret of potash for oxidizing silver-plated toilet and manicure sets? Also, is there any substitute for the cyanide dip that is used to remove the yellow stains after acid dipping?

A.—(a) Sulphuret of potash has been practically out of the market for over a year, but equally satisfactory results can be obtained by substituting with polysulphide or sulphurette. Sodium sulphuret solution can be made by adding yellow sulphur to a boiling hot solution of caustic soda.

(b) By using 4 parts of sal soda to 1 part of cyanide for the dip that is used after acid dipping a substantial saving in cyanide will be realized. A cheap substitute for cyanide that can be used to remove stains and tarnish is made by dissolving 4 ounces of sal soda and 2 ounces cyankalium surrogut per gallon.—O. A. H. Problem 2,733.

PLATING

Q.—I have a nickel solution composed of ¾-pound of double nickel salts to 1 gallon of water and I use the solution at 2½ to 3 volts with 30 amperes. I have added about 12 pounds of boracic acid to a 100-gallon solution and a white foam forms on the surface and when the current is applied it appears muddy, although after settling over night it looks clear.

A.—We do not think there is anything very seriously the matter with your nickel solution if you are obtaining a good deposit. In adding the 12 pounds of boracic acid did you dissolve the materials in boiling water before adding to the solution? Boracic acid is only slightly soluble in cold water or a cold nickel solution, so the turbidity noted when the solution is agitated would denote that it is due to the undissolved boracic acid in solution, which settles down to the bottom of the tank over night only to be stirred up again in the morning when you put work in the tank.

If you could arrange a portable steam coil in your tank say on Saturday afternoon and heat up the nickel solution to 120 degrees Fahr., there is no doubt but that the boracic acid will go into the solution and on cooling the solution would become clear and remain so. If afterwards the solution does show a slight turbidity it can be readily clarified by adding about two ounces of sulphuric acid dissolved in a pint of cold water, and thoroughly mixed with the solution. This should also be done on Saturday. The addition can be repeated and you will find it very beneficial to make the addition once or twice a week.—C. H. P. Problem 2,734.

Q.—We are having some difficulty in getting our brass solution to work satisfactorily. The solution is about two years old and has not been in use very much. We recently built it up, but are unable to coat the articles with a heavy deposit without the brass blistering. We can put on a light deposit without any trouble; we also find it hard to get a good rich brass color, the plate is very pale, particularly when the heavy deposit is on it. The solution seems to have a milky appearance which we do not understand. It is a cyanide solution.

A.—We would suggest that you make the addition of ½ to 1 ounce of cyanide per gallon of the solution. If the turbid, smoky tone of the solution is not changed add a little more cyanide and increase the conductivity of the solution, and in this case we would suggest the addition of 1 ounce of bisulphite of soda.

These additions should correct the solution, but if the brass tone is not a good yellow color and shows indications of a bluish appearance, then add small proportions of either ammonia, aqua ammonia or ammonium chloride—about ¼ ounce of the former and ⅓ ounce of the latter.—C. H. P. Problem 2,735.

Q.—We would like to get a good formula for a bright silver solution to be used on soft metal.

A.—A bright silver solution may be prepared as follows:

Water	1 gallon
Sodium cyanide	4 ounces
Silver cyanide	2 ounces
Carbonate of potash	¼ ounce
Bisulphide of carbon	2 grains

To prepare the solution dissolve the sodium cyanide in one-third the total amount of water to be used and heated preferably to 100 degrees. When the cyanide is dissolved then add the silver cyanide, then add the balance of the entire amount of water cold, then add the carbonate of potash and mix the solution thoroughly.

In order to prepare the bisulphide of carbon as a brightener say for a 100-gallon solution, mix together ½-ounce of bisulphide of carbon and ½-ounce of ether. Place in a bottle and partly fill with water, then add six ounces of sodium cyanide. Agitate the mixture and then add water to make

sixteen ounces or one fluid pint. The pint of mixture will contain two hundred and eighteen grains of bisulphide of carbon. One ounce of the mixture will be ample for every seven gallons of solution and as a precaution use about half that amount first.—C. H. P. Problem 2,736.

Q.—We are having considerable trouble with a steel stamping which we are nickel-plating. This stamping has a heavy oxide scale which we have been unable to remove by using different pickling solutions.

A.—We presume your product is made from hot rolled steel, the oxide or scale is always heavier on the hot rolled stock. We would suggest that a hot pickle prepared containing 1 part of muriatic acid and 1 part of water be utilized. A pickle composed of 1 part of commercial hydrofluoric acid and 3 parts of water heated to 160 degrees also gives excellent results. Either of these combinations should readily remove the scale, but they must be used hot.

Hydrofluoric acid cannot be used in a stone jar so we would advise using a wood tank lined with lead.—C. H. P. Problem 2,737.

Q.—I am having trouble with my black nickel solution. It plates very quickly, but has a smoky appearance and has to be run over on a wire wheel before finishing and then it comes up very black. I would like to get the solution so I would not have to run it over on a wheel. I have added single sulphate of nickel (5 pounds to 40 gallons of solution) and some arsenic, but it does not seem to do any good. My anodes get coated quite often.

A.—From the information imparted to us it would appear that your black nickel solution contains too large a percentage of nickel and not sufficient arsenic. Try adding 20 per cent. ammonia water first, in small proportions to produce a neutral solution. Also reduce the voltage so that the deposit forms a little more slowly. If this does not overcome your trouble dissolve 2 pounds of white powdered arsenic in a half a gallon of water, to which is added a pound of caustic soda. When dissolved add a little at a time to your solution until the color comes from the solution more uniform.

Black nickel solutions of the composition you are using do not give as good results as those made up from the sulpho cyanides of codium. The following formula is used very extensively and gives excellent results when used at a voltage not exceeding one volt. About half a volt has been found to give the best results.

Water	1 gallon
Double nickel salts	8 ounces
Sodium sulpho cyanide	2 ounces
Sulphate of zinc	1 ounce

Anodes of rolled nickel are used in connection with this bath.—C. H. P. Problem 2,738.

Q.—Will you kindly publish a formula for a good bright yellow brass solution that may be used to plate the inside of some silver plated boxes which are then to be finished with a flash gilt?

A.—For a good bright yellow brass solution try the following formula:

Water	1 gallon
Sodium cyanide	4½ ounces
Copper carbonate	3 ounces
Zinc	1 ounce
Soda ash	1 ounce
Sal ammoniac	⅓ ounce

Use a low voltage and good yellow brass anodes.

For the brightener to be used in connection with the above prepare a solution as follows: In a quart bottle place one ounce of bisulphide of carbon and 1½ ounce of chloroform and ½ ounce of white powdered arsenic. Fill up the bottle with a solution of cyanide of sodium, using about 4 ounces. Every evening after working the solution through the day add 1 ounce in the proportion to a hundred gallon solution. —C. H. P. Problem 2,739.

OXIDIZING

Q.—Kindly advise me how to obtain an oxidized finish on plated or sterling silver, as is seen on antique or old Dutch ware, also on toilet sets.

A.—The method most commonly used is to prepare a hot solution of polysulphite, which replaces silver of sulphur in the proportion of 2 ounces to each gallon of water, maintained at 180 degs. Fahrenheit. The silver plated articles become oxidized in a few moments. They should then be dried out, scratch brushed dry and then scored down with a slow running tampico brush and pumice stone and water mixed to a paste, and afterwards dried and lacquered.—C. H. P. Problem 2,740.

TUMBLING

Q.—We would like to bright finish steel record needles. We have tried tumbling with leather meal and crocus, and leather meal and powdered pumice, but without the desired results. Can you give us some information as to the best method of handling such articles?

A.—A bright lustre can be produced on steel phonograph needle in the following manner:

First, remove the oxide by immersing the needles in a solution of equal parts of muriatic acid and water. Second, tumble in water with pumice stone, to which is added about 2 ounces of soda ash per gallon of water and ½ ounce of sodium cyanide. Third, after tumbling as above for a sufficient length of time to produce a smooth surface, remove, wash and tumble. Fourth, the final tumbling should be with steel balls about ⅛-inch in diameter. The tumbling barrel should be of the oscillating type, and as a lubricant use powdered borax and powdered castile soap. Tumble until sufficiently bright. Fifth, finally, the needles may be tumbled in macerated leather and Vienna lime or carbonate of barium in powdered form.—C. H. P. Problem 2,741.

TINNING

Q.—We are attempting to tin small brass and copper castings by placing them in lots of about 56 pounds, in a perforated wrought iron pot, which is then submerged in molten tin and immediately afterwards revolved at high speed in a centrifugal machine to throw off all superfluous metal. Will you kindly give us the following information in order to improve the results we are at present obtaining:

(1) Satisfactory method of cleaning the articles before tinning.

(2) A suitable flux.

(3) A suitable covering for the surface of the molten tin.

(4) How we can prevent the oxidization which takes place in the centrifugal machine, and whether a neutral atmosphere would prevent this and give a bright finish? If so, how could we provide same in a chamber which is opened and closed at short intervals?

(5) Is a rumbling operation necessary to obtain good results, and, if so, what is the best medium to use?

A.—(1) The small brass and copper castings should be cleaned thoroughly by dipping in nitric acid or dipping acid (a trade term sometimes called Akee). If these acids cannot at present be obtained then the articles should be cleaned in cyanide of sodium (not potassium, as this is a sheer waste of money).

(2) A suitable flux is to make a concentrated solution of sal-ammoniac (that is as much as can be dissolved in water). Then add about one-fourth the bulk of hydrochloric acid to the concentrated solution of sal-ammoniac, dipping the articles into this flux and allowing to drain and dry before placing in the tinning pot.

(3) The molten tin should be covered with fine powdered sal-ammoniac, sufficient to prevent exposure of tin to the atmosphere.

(4) It is not practical to discuss working in a neutral or inert atmosphere. It is not even necessary, as when the tinning is properly done it retains its brilliancy. The oxidation complained of is probably due to imperfect clearing of the skin of silicon and sand on the castings, to which the tin cannot adhere.

(5) If the castings are not sand blasted, then barrelling with oil and emery is the most convenient form of removing the sand and at the same time imparting a good smooth surface to the articles. An ordinary shaking barrel (iron) should be used with the oil and emery added as a second treatment. The first rumbling is usually effected with scrap articles similar to the articles being treated.—G. J. Problem 2,742.

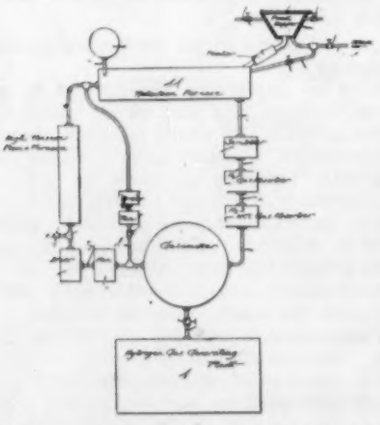
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

The age of these patent notices is due to the delay in the issuing of patent reports.—Ed.

1,310,724. June 24, 1919. **Reduction Process.** S. Westberg, Christiania, Norway.

This invention relates to the reduction of oxids, chlorids and oxychlorids of tungsten and molybdenum, and of the oxids of iron, by use of hydrogen gas as a reducing agent.

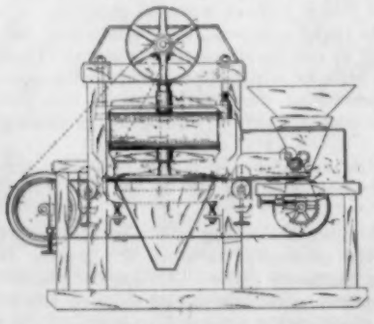


The object of the invention is to provide a process capable of being economically worked on a large manufacturing scale for obtainment of fine metals of the kinds stated.

In the accompanying diagram forming a part hereof, and illustrating the principle of this invention in what is now deemed the best of several varying modes now known, 1 indicates any practical kind of hydrogen-gas generating plant, and 2 a gasometer into which the gas is passed from the plant through a conduit 3. From the gasometer a conduit 4 leads through a fan-containing structure 5 which is connected by an eduction pipe 6 to a receptacle 7 in which moisture in the gas is eliminated as far as practicable; the receptacle being provided with calcium chlorid, $CaCl_2$ or other moisture-absorbing agent with which the gas comes in contact. The fan forces the dry gas from the receptacle 7 under sufficient pressure to cause it to flow through the conduit 8 which leads from receptacle 7 into a high-tension flame furnace 9 through which the fan pressure causes the gas, which is highly heated in the high-tension flame furnace, to flow onward in a continuous course into and through the conduit 10 which leads from the high-tension flame furnace into the reduction furnace 11 that may be of any suitable construction.

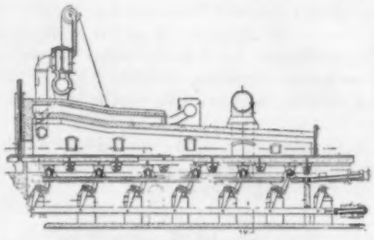
1,310,802. July 22, 1919. **Magnetic Separator.** R. A. Manegold and G. A. Fobian, assignors to Dings' Magnetic Separator Co., Milwaukee, Wis.

The object of this invention is to provide means for utilizing a non-magnetic carrier rotating substantially in a horizontal plane through a magnetic field of high intensity to convey magnetic material out of said field, and deposit it in a suitable hopper or receiver, whereby material including both magnetic and non-magnetic material) may be conveyed into the magnetic field by any suitable conveyer, such, for example, as an endless belt or apron extending underneath said rotary carrier, and the magnetized material lifted from the apron or belt into contact with said horizontally rotating carrier and held in contact therewith by magnetic attraction, until conveyed by the carrier beyond the zone or field of magnetic influence or to a point where the magnetic attraction is no longer sufficient to retain the magnetite against the under side of such carrier.



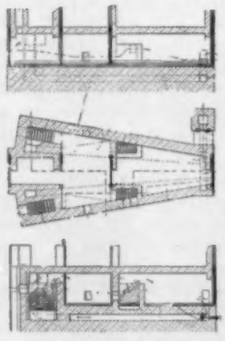
1,310,846. July 22, 1919. **Continuous Furnace.** Horace E. Smythe, assignor to S. R. Smythe Company, Pittsburgh, Pa.

One object of this invention is to provide a novel means for feeding metal articles, as tubes, billets, bars, and the like, through the furnace. Another object is to provide a feeding means whereby an indefinite number of articles, from one up to the maximum capacity of the furnace, may be fed through the furnace, it not being required that the articles contact one with another, as is necessary with many furnaces. Another object is to provide means whereby the air may be suitably and inexpensively preheated before entering the furnace.



1,310,911. July 22, 1919. **Furnace for Annealing Metal Plates.** William John, Swansea, Wales.

This invention relates to the construction of furnaces of the kind which are used for annealing metal, more especially rolled iron plates preparatory to being tinned or plated.

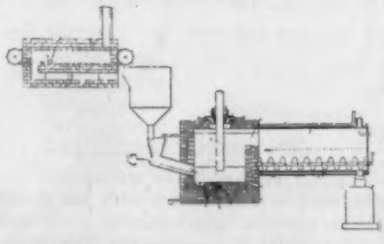


The main object of the invention is to conserve the heat, reinforce it where required, and apply it in the most effective way to secure the desired results.

With these objects in view, it is proposed to build the furnace on a substantially tapered plan, the door-way for admission of the trolleys being at the smaller end, another for their discharge at the larger end, and fireplaces, one on each side of the discharging door, the purpose being to distribute the heat evenly on both sides and to concentrate the heated streams of air and gas and prevent their being unduly dissipated and cooled before reaching the smaller end. For the same purpose and to increase the heat and combustion where most wanted, it is proposed to provide additional fire places and other improvements.

1,311,378. July 29, 1919. **Process of Producing Alkali Earth Metals.** W. F. Bleecker and W. L. Morrison, Canonsburg, Pa., assignors to Electric Reduction Company, a corporation of Delaware.

This invention relates to processes of producing alkali earth metals. The main object is to provide a simple, cheap and efficient process, by which such metals can be obtained in solid or liquid form, with great ease and rapidity. More specific objects will more clearly appear from the detailed description given below, taken in connection with the accompanying drawing, which illustrates one form of apparatus for carrying out the process and which forms a part of this specification.



While the invention is applicable to the production of various of the alkali earth metals, it is especially advantageous for the production of magnesium in solid or liquid form. In order to illustrate this invention, the process for the production of magnesium will therefore be described in detail, which embodies the improvements in one form.

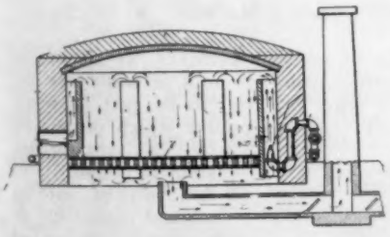
Magnesium is taken containing material, preferably magnesium oxid containing material, such as magnesite or dolomite, and if the materials have not already been suitably calcined, they are then placed in a reverberatory furnace and heated, so as to remove moisture therefrom and to break up any carbonates which may be present and so remove deleterious oxidizing components therefrom. With this calcined material in crushed form a suitable reducing agent is mixed, preferably a metalloid reducing agent, such as crushed silicon or granulated metallic aluminum, or both. By the term metalloid reducing agent, is meant a reducing agent or agents forming fusible slags which are substantially unvolatilized or undecomposed at the working temperature of the furnace and which are capable of not only depriving magnesium of oxygen at a temperature above 1200° C., but likewise are capable of retaining oxygen in the slag at a temperature below 1200° C. Under certain circumstances, other reducing agents may be used. The reducing agent is mixed with the magnesium oxid containing material in substantially molecular proportions, according to the formulas

$$3MgO+2Al=3Mg+Al_2O_3$$
$$2MgO+Si=2Mg+SiO_2$$

Then preferably add 25 per cent excess (of the alkali earth metal oxid) of magnesium oxid or its equivalent, calcium oxid, preferably partly both, to promote fluidity when the mixture is later reduced to molten slag. 5 to 10 per cent (of the total alkali earth oxid) of fluorspar CaF_2, or silicon, Si, may also be added to thin the slag and make a better flux, especially if aluminum is used as the reducing agent. If silicon is used it promotes the fluidity of the resultant slag and it may be used more or less without special flux or used with aluminum to improve the fluidity of the slag. The mixture, preferably hot, is then transferred or fed to an electric furnace, preferably alternating current, in which it is fused. The voltage of the electric furnace will, of course, vary with the nature of the slag, &c., but in some instances, we have found a voltage in the neighborhood of 40 or 50 volts suitable. The electric furnace is preferably of the conducting hearth type with the bottom or wall of the furnace forming one electrode, while the other electrode or electrodes are adapted to have their ends immersed in the molten mixture or bath. The bottom or wall of the furnace, which forms one electrode, is preferably constructed of magnesite brick (although carbon material may be used) with suitable metallic contacting members leading thereinto. The current passing from one electrode to another heats the mixture and fuses it. It was found in certain mixtures a temperature of 1300° to 1500° C. was sufficient to produce a molten mixture. Due to the high heat, the magnesium oxid reacts with the aluminum or silicon or both, and metallic magnesium is volatilized, forming vapors thereof. These magnesium vapors are then conducted into a condenser and condensed to form metallic magnesium in solid or liquid form. If condensed very rapidly, that is, suddenly chilled, the magnesium vapors condense to form a fine powder, mostly impalpable and of dark color, having generally the characteristic that it is incapable of being fused together to form a liquid.

1,311,286. July 29, 1919. **Kiln.** Frank Mulhollan, assignor of one-third to Charles F. Lockhart of Cleveland, O.

This invention relates to kilns, particularly adapted for burning or drying brick, but capable of use on other articles if desired. The object of the invention is to provide improved means for distributing the heat in a kiln of the downdraft type, a characteristic feature of the structure being the use of vertical flues arranged in the kiln, and adapted to conduct the gases from a lower compartment, below the floor, to an upper compartment, these compartments being separated by a floor on which the bricks or other articles are supported, this floor having openings through which the gases pass downwardly, so that there is a continuous circulation downwardly through the floor and upwardly through the flues. Means are provided for inducing the upward flow through the circulation flues.

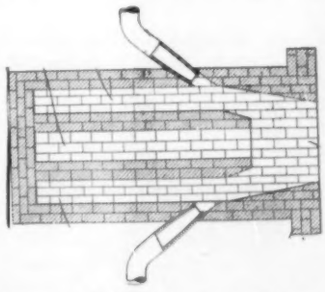


1,311,379. July 29, 1919. **Apparatus for Producing Alkali Earth Metals.** W. F. Bleecker and Walter L. Morrison of Canonsburg, Pa., assignors to Electric Reduction Company, a corporation of Delaware.

This invention relates to improvements in apparatus for producing alkali earth metals. The main object is to provide a simple, cheap and efficient apparatus by which such metals can be obtained in solid or liquid form, with great ease and rapidity.

1,311,515. July 29, 1919. **Gas Burner for Furnaces.** John George Hess, Adamston, West Virginia.

This invention relates to improvements in gas burners for furnaces, the object of the invention being to provide an improved burner for furnaces which are known as continuous heating furnaces, by means of of which a thorough intermingling of the gas and heated air before entrance into the combustion chamber is accomplished.

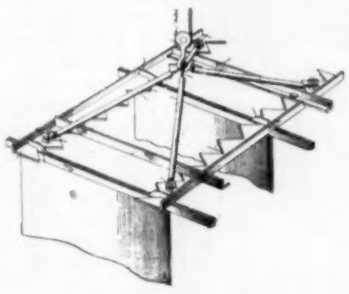


A further object of the invention is to provide a burner which may be used for either natural or artificial gas without the necessity of rebuilding the furnace.

A further object of the invention is the provision of a burner of the character set forth which is comparatively simple in construction and extremely economical in operation.

1,311,958. Aug. 5, 1919. **Electrode Rack.** John Spense Finlay of Great Falls, Montana, assignor to Anaconda Copper Mining Company, Anaconda, Montana.

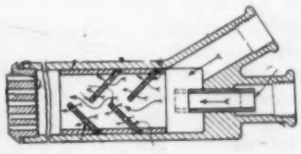
The present invention relates to racks suitable for use in metal-recovering plants.

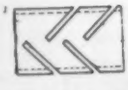


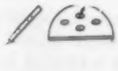
Great difficulty has been experienced in securing means positive in its action for lifting from a cell at one time electrodes in multiple. It is the special object of this invention to provide a rack which will securely grasp electrodes in multiple and after they are lifted, keep them accurately spaced and at the same time be simple, light and easily operated.

1,312,147. Aug. 5, 1919. **Gas and Air Mixer.** Josiah Mower Wallwin, Warwick, England.

The present invention refers to burners used for heating purposes in which the air and gas are supplied at a pressure above atmosphere, and refers more particularly to such burners employed for metal heating, hardening and tempering furnaces and the like, the main object being to provide a burner of the kind referred to of improved construction whereby efficient commingling of the gas and air is effected without unduly impeding the flow of the combustible mixture, a further object being the provision of means whereby the effect of the air upon the gas (or the gas upon the air), as it enters the conduit, may be regulated



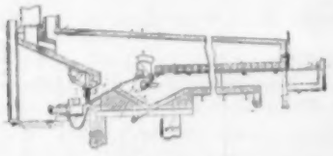




so as to give either a choking effect, a sucking effect, or to give such effects if and when required to the extent desired, the general result being a greater heating efficiency and a reduced consumption of gas.

1,311,962. Aug. 5, 1919. **Metal Heating Furnace.** Jerome R. George, assignor to Morgan Construction Company, Worcester, Mass.

This invention relates to that class of metal heating furnaces which are designed for heating ingots or billets preparatory to their reduction by rolling, and it has for its objects, to secure a more uniform heating of the metal, and to provide means for the automatic discharge of the heated metal from the furnace.



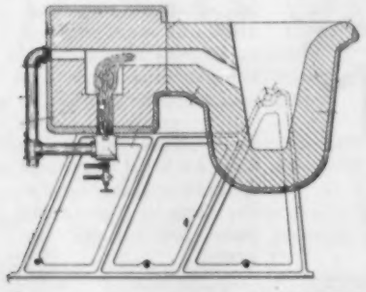
1,312,057. Aug. 5, 1919. **Scrap-Winding Reel.** Howard B. Sherman, Battle Creek, Michigan.

This invention is an improvement in scrap winding reels, or machines for bundling the waste stock obtained in manufacturing articles from metal ribbons or strips supplied to the operating machines, which cut blanks or portions from the strips and operate thereupon while the remainder or waste portion of the strip is discharged as scrap.

The objects of the present invention are to provide a novel compound reel for winding up such scrap as it issues from the operating machine and prevent it littering the floor and interfering with the machine during the operation thereof; and to enable the wound scrap to be readily tied up in bundles before the same is rewound from the reel, and to enable the bound bundle of scrap to be readily removed from the reel.

1,312,129. Aug. 5, 1919. **Furnace for Melting Metals.** W. Macleod, Cincinnati, Ohio.

The object of this invention is to produce a furnace for melting metals formed of two separate chambers, one being the furnace proper for producing the heat units or heat waves and the other being the melting pot; the heat produced in the furnace chamber being forced to travel through a duct into the melting pot. In this way the necessity of using a crucible made of plumbago or equivalent refractory material, and directly heated, is obviated.



1,312,154. Aug. 5, 1919. **Aluminium-Solder Flux.** Charles Leslie Bonsteel, Moose Jaw, Saskatchewan, Canada.

The object of the present invention is to produce a flux for use in conjunction with a suitable aluminium solder which will effect a thorough union between the solder and the members to which the solder is united.

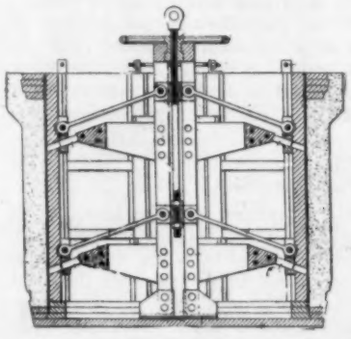
The invention consists essentially in the novel admixture of ingredients in or about the proportions named.

The mixture of ingredients which gives the most satisfactory results in effecting a union of aluminium solder with aluminum articles comprises the following ingredients in or about the proportions named: aluminium chlorid, 265 parts; zinc chlorid, 320 parts; borax, 2 parts; paraffin wax, 67 parts; beef tallow, 25 parts; sulfur, 25 parts.

These ingredients are all placed together and heated till thoroughly melted and when cooled form a soft paste which is spread over the surface of the material to be soldered. The paraffin wax forms a binder to unite the aluminium and zinc chlorids and the borax and sulfur and the beef tallow is preferably used as a softener to prevent crystallization and hardening of the flux. The beef tallow may possibly be substituted by other forms of grease but the tallow produces the best results in the final use of the flux as it does not discolor or gum up the work, whereas it is found that substitutes for the beef tallow produce a dirty finish and do not make as uniform a flux.

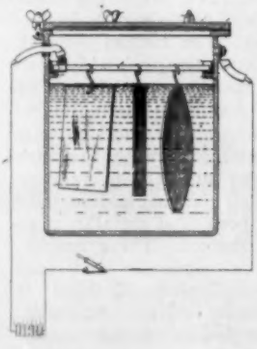
1,312,157. Aug. 5, 1919. **Collapsible Core for Molds.** Charles F. Buente, Avalon, Pa.

This invention relates to an improvement in collapsible cores for molds, and more particularly to cores for concrete molds.



The object of the invention is to provide a core which can readily be collapsed and extended, and in which all of the parts are connected to each other. A further object of the invention is to provide a core in which the various members will automatically be collapsed when a single operating member is actuated. A further object of the invention is to provide a core in which the tops and the bottoms of the members can be adjusted relative to each other, and in which all of the members will be moved at an angle to the axis of the mold and at an angle to the line at right angles to the axis of the mold.

1,303,627. May 13, 1919. **Treatment of Iron or Steel or Other Articles.** Henry C. Baines, of Springfield, Massachusetts, assignor, by Mesne Assignments, to the Cleveland Metal Products Company, of Cleveland, Ohio.



This invention relates to the treatment of iron or steel or articles having a surface of iron or steel.

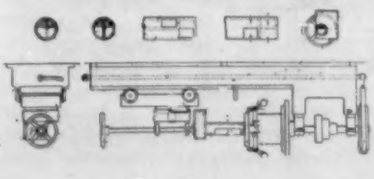
The treatment referred to consists in effecting a deposit of phosphate of iron, or a deposit consisting of a mixture of normal ferris and ferrous phosphates of iron, upon the surfaces of the articles; and the general objects of the invention are to accomplish this result in a much shorter time than that heretofore required, to insure a relatively deep penetration of the deposit into the iron of which the articles are composed or with which they are surfaced, to prevent the evaporation of the solution employed for coating the said articles, to retain the liberated hydrogen.

A solution or compound which gives satisfactory results is as follows:

Iron in the form of filings or powder.....	2 ounces
Phosphoric acid, concentrated	4 fluid ounces
Water	160 fluid ounces

1,309,823. July 15, 1919. **Casting-Machine.** F. W. Stokes, Nottingham, England.

This invention relates to casting machines, as shown in cut, of the kind in which a rotating mold is made use of, into which the metal or other material to be cast is introduced through a centrally arranged pourer which is carried by a supporting stem or spindle and is furnished with a storage receptacle or reservoir mounted eccentrically with respect to the pourer.



EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

THE CALORIZING PROCESS

A METHOD OF PROTECTING METALS FROM OXIDATION AT HIGH TEMPERATURE.*

In the calorizing process, the metal chosen is aluminum, and the protective action is due to the oxide formed by the action of heat on the protecting alloy rather than to any electrolytic relation between the aluminum and the base. The product is distinguished from that of other processes such as sherardizing, hot galvanizing, etc., in that they are intended primarily to give protection against oxidation at ordinary temperatures, or corrosion, as it is frequently called, while the calorizing process is intended primarily to protect against oxidation at high temperatures.

The calorizing process was developed about 1911 in the Research Laboratory of the General Electric Company in the course of a series of experiments instituted to find a method of protecting electric heating elements. The process was later turned over to the Calorizing Corporation of America, Detroit, Michigan, as its industrial and commercial importance warranted its handling by a separate organization specializing in oxidation problems.

In treating metals by the calorizing process, they are first thoroughly cleaned, then placed in a stationary or rotary retort in a reducing atmosphere, with a mixture composed of finely divided aluminum and aluminum oxide. This treatment, conducted at a temperature of 600 to 1100 degrees C., depending upon the depth of alloy desired, so thoroughly infuses aluminum

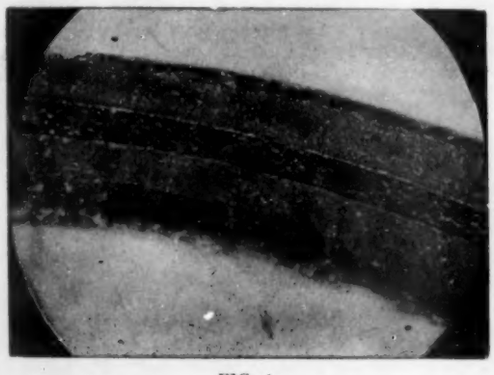


FIG. 1.
MICROGRAPH OF CALORIZED TUBE.

into the exposed portion of the metal being treated, as to form a homogeneous aluminum alloy for a certain depth. This depth ranges from a few thousandths of an inch to the permeation of the entire mass, varying with the duration of the treatment.

Figure 1 shows a micrograph of a cross-section of calorized tube which has been in service for several hundred hours. The essential point in difference between the effects of the calorizing and most of the processes hitherto used commercially, such as galvanizing, plating or coating, is that the protective metal is not imposed as coating or skin upon the metal to be treated, but rather enters into intimate association with it, forming a "solid solution" alloy. For this reason, should the outer surface become slightly injured, the protective surface renews itself. Calorizing is not intended to protect against rusting or corrosion, as is sherardizing for example, but it is primarily a protection against burning or scaling. Calorized copper, brass or nickel, however, are also excellent noncorrosive elements and are strongly resistant to the acid.

Calorized iron will withstand temperatures of 1800 degrees Fahr., whereas, untreated metal begins to oxidize noticeably at 1100 degrees Fahr., and at 1800 degrees Fahr., its disintegration is extremely rapid. Many gases contain sulphur dioxide and carbon monoxide which have an extremely deleterious effect on ordinary metal, but tests have shown that calorized metal is not affected by these gases, even in the percentages in which they occur in furnace gases.

*By courtesy of Robert June, Calorizing Corporation of America, Detroit, Mich.

AUTOMATIC COCK GRINDER

This grinder is operated by steed rack and gears, the spindles making one and one-eighth revolutions in each direction. Its every movement is identical with our smaller cock grinders, but owing to the weight of the large cocks which this machine grinds, from 4" to 8" inclusive, it was found necessary to grind them vertically. It grinds cocks better than can be ground by

TURNER AUTOMATIC COCK GRINDER.

hand and will grind four or five cocks (8"), while a man could grind only one by hand. The machine is well and substantially built, fitted with cone pulleys, and weighs approximately 7,000 pounds. It is manufactured by the Turner Foundry & Machine Co., Philadelphia, Pa.

A NEW COMPENSATED HEATMETER*

This improved Heatmeter will unquestionably appeal to the practical man who wants results and does not care especially how the instrument functions provided its indications can be relied upon.

In testing with this apparatus all that is necessary is to connect the thermo-couple with the instrument binding posts in the usual manner, press the button, turn the knob, and take a reading, which will be the correct e.m.f. of the thermo-couple at its hot end, even if the line is miles in length. In fact the line may have as much as 15 ohms resistance.

In the actual construction of the instrument for technical and practical use, the movable system consists of a highly sensitive copper or aluminum coil suitably mounted in an intense magnetic field. In place of the plug a three-way press button is used. In fact, it is preferable to proportion the shunt so that the current through the circuit as a whole may be increased eight to ten times. The deviation of the pointer from normal will therefore be large for even a very slight change in line resistance, permitting easy adjustment.

It is in order to add that, while an experimental model has

*Courtesy of Mr. Charles P. Frey, Chief Engineer, The Brown Instrument Co., Philadelphia, Pa.

been referred to for data, the development of these instruments has long since passed the experimental stage, and, in practical form, the improved Brown Heatmeters, incorporating the Harrison Foote method, have all of the following advantages:

They are direct reading throughout their entire scale range.
They require no dry cells or standard cells.
They are independent of line or thermo-couple resistance.
They have a negligible temperature co-efficient.

BROWN HEATMETER.

The operation of the instruments is simplicity itself. It cannot be questioned but that such an instrument is a radical improvement on any of the various forms of electric pyrometers heretofore available and represents another noteworthy advance in pyrometry.

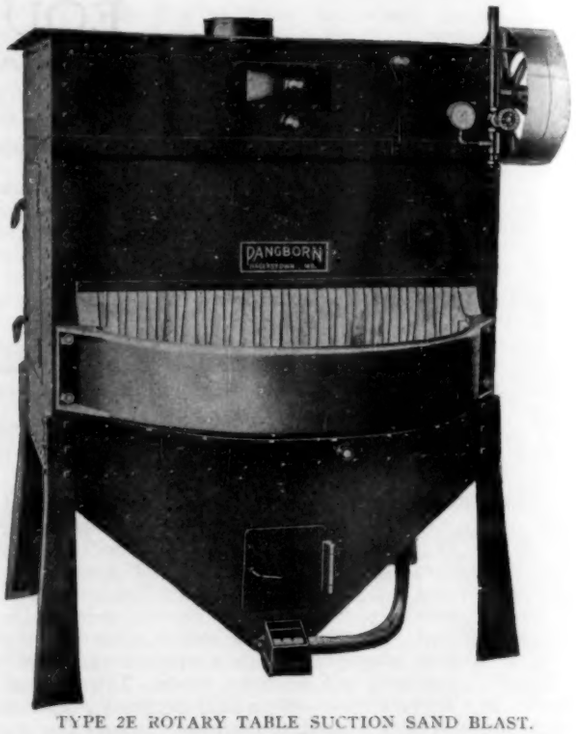
PANGBORN AUTOMATIC SAND-BLAST FOR WORK OF LIMITED SIZE AND VOLUME

The demand for hygienic sand-blast equipment that protects the operator, naturally arose in the shops of large volume, the first efforts to meet these demand were in this field; and while some efforts have been made to meet the needs of the shops producing a small volume of work and of limited size, this has heretofore been largely in the nature of efforts to adapt existing equipment to these conditions, or with devices that did not provide automatic cleaning.

The success of the Automatic Rotary Table, with its continuous operation, ability of the operator to see progress of the cleaning, while at the same time working in the open free from dust, has created a demand for a machine of this type that in size and cost would be within reach of smaller plants.

We illustrate herewith a new machine just marketed by the Pangborn Corporation, Hagerstown, Maryland. It consists of a rotating table half exposed, and half in a dust tight housing in which the blasting action takes place. Work to be cleaned is loaded, turned as required, removed and renewed while the machine is in operation. The table top is 42" in diameter and the entire device requires a floor space of but 4' 8" x 4' 3". The sand-blast action is of the suction type, the spent abrasive falling through the grated top of the table and returned to the blasting member in a continuous cycle.

The blast projector takes air nozzles interchangeably from 1/4" to 5/16" diameter and at 80" pressure the air consumption, with the smaller size nozzle is as low as 21 cu. ft. free air per minute, while the entire power for driving the table is but



TYPE 2E ROTARY TABLE SUCTION SAND BLAST.

1½ horse power. This makes the machine adaptable to the smaller shop as also an admirable auxiliary to larger equipment for special uses, or to take care of periodical peak loads.

The table top is provided with a 4" high guard, which acts as a retainer for light work, which otherwise might be dislodged or blown off by air force: and with a 10" opening for passage of the work to and from the blasting zone it is available also for pieces of some considerable size and weight. This opening through which the pieces pass from the exposed portion to the blasting zone is closed by multiple, sectional, flexible rubber curtains, which retain the flying abrasive and dust, making it a hygienic machine and available for installation with other machine tools, without detriment.

The table is equally adaptable for use with either sand or metal abrasive.

The weight of the machine is only 1,750 pounds, and provision is made for connection to an exhaust system for quick removal of dust and disintegrated material.

COTTRELL PROCESS PRECIPITATION

An interesting model of a precipitation outfit, illustrating the Cottrell Process Precipitation, will be exhibited by the General Electric Company, at the Chemical Exposition to be held at the Coliseum, Chicago, September 22 to 27.

The model is the property of N. H. Gellert of the Gellert Engineering Company, which holds the precipitation patents as applied to blast furnaces. It was made by the General Electric Company, and is an exact miniature of the apparatus and is completely operative. Other apparatus exhibited by the General Electric Company includes a KT-312 6-15H. P., 1,200 R. P. M. 440 volt motor with frame and coils completely coated with an acid resisting insulation, which is particularly adapted for use in chemical and fertilizer plants. Two stator coils of this motor were shown. Another feature was an RC-25, 2 H. P., 1,150 R. P. M., 230 volt, totally enclosed DS-2 shunt wound motor which is equipped with the new Arguto plug bearings. A 100,000 volt Konotrom with a filament heating transformer, was shown in operation. Of special interest was an exhibit board, showing welded terminals for flexible cables used on blast furnaces.

Chester T. McLaughlin, of the power and mining department, Schenectady works, is in charge assisted by Raymond Barclay and several representatives from the Chicago office of the General Electric Company.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

JOINT MEETING OF MINING AND METALLURGICAL ENGINEERS AND AMERICAN ELECTROCHEMICAL SOCIETY

From data and information at hand the forthcoming Fifth Annual Exposition of Chemical Industries at the Coliseum and First Regiment Armory in Chicago, during the week of September 22nd, promises with its attendant society meetings to be an assemblage worthy of the best accomplishments of this great exposition.

The events outlined which are of especial interest to the metal industries are as follows:

WEDNESDAY, SEPTEMBER 24TH, 1919.

10:00 A. M. Meeting at Chemical Exposition of American Electrochemical Society for reading and discussion of papers; "The Effect of Amalgamation Upon the Single Potential of Aluminum," by Louis Kahlenberg and John A. Montgomery.

2:00 P. M. Joint Technical Session American Electrochemical Society with American Institute Mining and Metallurgical Engineers at Chemical Exposition Auditorium. Subject: "Ferrous and Non-Ferrous Metallurgy." Among the papers to be represented are: "Electric Resistance Furnace of Large Capacity for Zinc Ores," by Charles H. Fulton; "Electrolytic Zinc," by C. A. Hauser; "Treating Antimony Ores," by George P. Hulst; "Water and Chlorides in Cement Copper," by Edward Keller; "Chemical and Electrochemical Problems Involved in the New Cornelia Company's Leaching Process," by Henry S. Mackay; "Radiant Resistor Furnace," by A. J. Fitzgerald; "Electric Heat in the Typewriter Industry," by A. M. Clark; "Electric Furnace for Experimental Work," by A. J. Fitzgerald. Many more papers are in the hands of the American Electrochemical Society Paper Committee for acceptance for these meetings. After meeting is adjourned the Electric Furnace Exhibits will receive careful inspection.

8:00 P. M. Motion Pictures in Chemical Exposition Auditorium. 1. "Resistance Type Furnaces for Melting Non-Ferrous Metals," 2 "Electric Furnaces in the Heat Treatment of Essential War Materials" (both films by courtesy of Electric Furnace Co.), 3 "The Detroit Rocking Electric Furnace in Operation" (Courtesy of Detroit Electric Furnace Co.).

THURSDAY, SEPTEMBER 25TH, 1919.

10:00 A. M. Meeting of American Electrochemical Society jointly with American Institute of Mining and Metallurgical Engineers. Symposium on "Pyrometry" at Congress Hotel.

FRIDAY, SEPTEMBER 26TH, 1919.

9:30 A. M. Meeting American Electrochemical Society at Chemical Exposition Auditorium. Subject: Symposium on "Catalysis."

In the exhibit of the U. S. Bureau of Mines there will be experts on various phases of mining, metallurgy and the chemistry of metals and minerals to give information and assistance to all who inquire. They will be present at stated periods each day.

Charles M. Schwab, chairman Bethlehem Steel Corporation, will be a speaker at the banquet of the American Institute of Mining and Metallurgical Engineers.

In addition to some hundred and fifty papers which have been prepared for the meeting, which will be held in the last week of September, trips to the zinc smelting districts, the steel works at Gary and the refineries at Whiting and East Chicago are included.

All inquiries should be directed to Mr. Charles F. Roth, manager, Fifth National Exposition of Chemical Industries, 417 South Dearborn street, Chicago, Ill.

THE INSTITUTE OF METALS

The Autumn meeting of this institute will be held in Sheffield, England, from Sept. 24 to Sept. 27. The program will include the following events of interest:

COMMUNICATIONS.

(1) Professor P. G. H. Boswell, O. B. E. (Liverpool), on "Moulding Sands for Non-Ferrous Foundry Work."

(2) Professor C. H. Desch, D. Sc., Ph. D. (Glasgow), Second Beilby Report on "The Solidification of Metals from the Liquid State."

(3) Miss H. E. Fry (Teddington) and Dr. W. Rosenhain, F. R. S., Vice-President (Teddington), on "Observations on a Typical Bearing Metal."

(4) Dr. W. H. Hatfield and Captain G. L. Thirkell, B. Sc. (Sheffield), on "Season Cracking of Brass."

(5) R. E. Leader, B. A. (Sheffield), on "The Early History of Electro-Silver Plating."

(6) E. A. Smith and H. Turner (Sheffield) on "The Properties of Standard or Sterling Silver, with Notes on its Manufacture."

(7) Dr. J. E. Stead, F. R. S. (Middlesbrough), on "The Ternary Alloys of Tin—Antimony—Arsenic."

(8) Dr. F. C. Thompson, B. Sc. (Sheffield), Note on "Graphite and Oxide Inclusions in Nickel Silver."

(9) Dr. F. C. Thompson, B. Sc., and F. Orme, M. Met. (Sheffield), on "Some Notes on the Constitution and Metallurgy of Britannia Metal."

All inquiries should be addressed to Mr. G. Shaw Scott, M. Sc., 36 Victoria Street, Westminster, London, S. W. I.

NATIONAL SAFETY COUNCIL

At the Eighth Annual Safety Congress of the National Safety Council in Cleveland, October 1 to 4, some of the most important problems before American industry today, such as the anticipation of labor unrest, increasing plant efficiency and production, decreasing manufacturing costs and the whole subject of labor management will be discussed in connection with general subject of accident prevention. There are scheduled 160 speakers, who will address 3,000 men and women who direct the safety work of the nation's greatest industries. There will be four general sessions, four round tables, and 35 sectional meetings during the congress. There will be three meetings each of the metals, mining, and steam railway sections.

All inquiries should be directed to Mr. Louis Resnick, director of publicity, care of National Safety Council, 168 North Michigan avenue, Chicago, Ill.

THE FARADAY SOCIETY

At the Ninety-third Ordinary Meeting of the Faraday Society, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W. I., England, July 14, 1919, the following events of interest to the non-ferrous metal industries took place:

MR. F. H. JEFFERY, M.A., read a paper entitled "The Electrolysis of Solutions of Sodium Nitrate using a Silver Anode."

A paper by MR. W. E. FORSYTHE, of the Nela Research Laboratory, Cleveland, U. S. A., on "The Disappearing Filament Type of Optical Pyrometer," was presented by DR. EZER GRIFFITHS, who exhibited some of the instruments described in the paper.

MR. E. A. ASHCROFT read a paper "ON SOME CHEMICALLY REACTIVE ALLOYS," accompanied by experiments.

Those interested can communicate with The Faraday Society, 10 Essex street, Strand, London.

AMERICAN ELECTROPLATERS SOCIETY

New York Branch of the A. E. S. meets second and fourth Fridays of each month at 32 Union Square, New York City. Secretary, John Burke, 110 Glen St., Brooklyn, N. Y.

The August meetings of the New York Branch of the A. E. S. were well attended. President Sterling presided. One new applicant was elected to active membership; two applications were referred to the board of trustees. The $AgNO_3$ solution was the topic discussed and the laboratory committee was instructed to investigate this solution and publish the results with the analysis of the deposit, in the society's official publication.

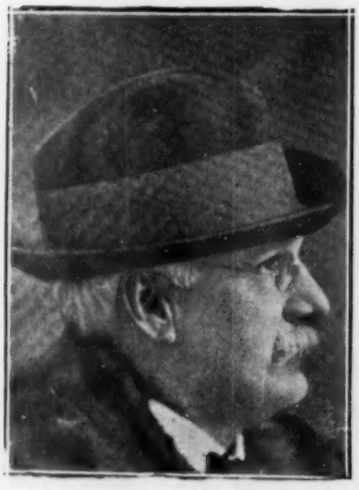
PERSONALS

ITEMS OF INDIVIDUAL INTEREST

DEATH

HENRY W. SCOVILL

Henry William Scovill, for many years a director of the Scovill Mfg. Co., died suddenly at his home, "Rest-a-while," in Watertown, Monday evening, Aug. 25, at the age of 66 years. Mr. Scovill went to the hospital a week before his death after an acute attack of indigestion, but apparently had fully recovered, when he returned to his home Monday. In the evening, however, he had an attack of heart failure, and death was almost instantaneous.



HENRY W. SCOVILL.

Mr. Scovill was born in Waterbury, Nov. 11, 1853, and was the youngest child of James Mitchell Lamson Scovill. He married Elsie Hyde March 5, 1874. He leaves besides his widow, three children, Elsie Margaret, Mrs. C. A. Aspinwall and H. Lamson Scovill, and five grandchildren.

While never engaged in active business, Mr. Scovill was for many years a director of the Scovill Mfg. Co. here. He was always deeply interested in all Christian work, especially that of the Y. M. C. A.

After Mr. Scovill returned from Europe, where he traveled extensively from 1903 until 1912, he purchased the David Hard property in Watertown, and there he lived a quiet retiring life, although he continued his financial interest in several industries as stockholder and director, including the Scovill Co.

Mr. Harry Greene, electroplater, of Providence, R. I., is leaving for Buenos Ayres, Argentine Republic, to engage in the jewelry business.

Clarence M. Little, who represents the American Brass Company in the Philadelphia district, is planning to move his family to that city shortly.

B. W. Gilchrist has left the Simon Zinn Co. to take charge of the new plating department of the Spicer Manufacturing Company of South Plainfield, N. J.

Elmer W. Woodmansee of Dayton, Ohio, has resigned from his position as foreman of the Polishing and Plating Department of the Corcoran Victor Company, of Cincinnati, Ohio, to take charge of the Polishing Department of the Cadillac Motor Car Co. branch of the General Motors Corp. of Detroit, Michigan.

Robert Voigtlander, formerly of Montreal, Canada, has become connected with the Southern Brass Manufacturing & Plating Company of Houston, Texas, in charge of sales and will cover the territory embracing Texas, southern Oklahoma and western Louisiana. The principal line of goods handled by this company at the present time is brass supplies for oil fields, but expect shortly to branch out into architectural and statuary bronze work.

William F. McFall, for the past 11 years a foreman at the plant of the Standard Metalwork Company, of Thompsonville, Conn., has resigned his position and Monday will begin new duties as manager of the Miller metal works in Southington. This company was established by James Acton Miller, formerly connected with the local plant, but is now controlled by John H. Brandnack, also a former Thompsonville man.

Mr. McFall has taken an active part in fraternal circles during his residence in Thompsonville, being a member of both Doric Lodge of Masons and Friendship Lodge, I. O. O. F.

Sheridan H. Knight, manager of the Litchfield County Realty Company since its organization and with the firm of J. B. Reid & Company for several years before, has resigned and **Frederick H. Baldwin,** for many years in the wood department of the American Brass Company, has been appointed to succeed him. Mr. Knight will sever his connection with the company on September 1 and Mr. Baldwin will take charge on that date. Mr. Baldwin withdraws from his position with the American Brass Company on account of the curtailment of the wood department. The American Brass Company is now using oil to a great extent where formerly it used wood in its manufacturing processes, and the company has, it was stated today, a large quantity of wood on hand. Mr. Knight stated that he had not made any definite plans for the future.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

BRIDGEPORT, CONN.

SEPTEMBER 8, 1919.

For the past month or so Bridgeport has been in the throes of a strike situation at least seemingly as serious as that which required the presence of the War Labor Board here some time ago. Out of the city's shops and factories the number concerned in recent strikes reached 21, of which all have by now been settled except the Columbia Graphophone Company.

In most of the strikes the demand was for higher wages and in some for higher wages plus shorter hours. The 44 hour week proved a stumbling block to settlement in many of the strikes and in some of them has merely been laid on the table for the time being to be settled later.

Practically every metal using shop in the city has been involved in the recent strike wave at one time or other. The strike started apparently with the Warner Brothers Company from where it spread rapidly to other shops and factories in the city. Warner's strike was settled eventually after it had spread to other corset factories in the city but by that time workers in other trades had become involved in strikes of their own, the railroad strike coming along as a culminating point to the entire situation.

The Graphophone strike is at present absorbing the entire attention of the city. The workers demanded more pay and shorter hours, and when their demands were refused, walked out of the shops, both East and West End plants being involved. This situation continued for a short time when like a bolt out of the blue the Graphophone announced that it had decided to leave Bridgeport and locate in some other city.

At first the strikers thought that this was mere "bluff" on the part of the company to induce the workers to return but

subsequent actions on the part of the company, such as boxing their machinery, etc., have led the striking workmen to believe that the company really intends to carry out this plan.

The strikers at the company have been divided into two ranks, those which hold allegiance with the American Federation of Labor and another which binds itself to the Workers International Industrial Union, W. I. I. U. The W. I. I. U. men have already decided not to accept any terms offered by the company which do not include a 50 per cent raise in pay. The A. F. of L. decision has not yet been reached at this writing.

The Chamber of Commerce and the Mayor of the city are reported to have interceded with the company and endeavored to get it to reconsider its intention of leaving the city. Such a step would admittedly be a big blow for Bridgeport, the Graphophone employing in the neighborhood of 6,000 workers and having an annual pay roll of approximately $8,000,000.

No change has been announced in the company's plans however, despite the intercession of the Chamber of Commerce and preparations for moving to some other city are steadily being completed. It is reported that the only condition which would lead the company even to reconsider its intention is the agreement of the strikers to return to work on the old basis in effect before the present strike. This the majority of strikers seem at present averse to doing.

To complicate the labor situation here dissension has arisen in the ranks of the Machinists' Union. Samuel Lavit, for some time business agent of the local union, has been ousted by international officers and the local lodge outlawed from the national body. Lavit has a group of firm supporters in the local lodge and these are still continuing to support their leader. A new lodge, No. 161, has been formed by the international officers and the membership of the old lodge has been split, some retaining their membership in old lodge No. 30 despite its being outlawed and the remainder joining the new lodge.

It was announced last week that the Eagle Pin Company would locate here in the near future, John C. Stanley, of the American and British Manufacturing Company, being the president of the above mentioned concern. The Eagle company will manufacture the composition headed pins in various colors, white, black and several other colors. It is thought that the new factory will start operations within two or three weeks.

The Bridgeport Castings Company is also incorporated in this city to start business Sept. 10 in the plant formerly owned by the Bridgeport Tube Works. The new company has been incorporated for $100,000 and is to manufacture brass, bronze and aluminum castings.

The Scoville Manufacturing Company is helping in a practical way to solve the high cost of living for its employees. Some time ago the Scovill Company went into the meat business, selling directly to employees at cost prices. The experiment has proved highly successful. A cost store will be opened in the near future. The beef distributed comes from the company's stock farm at Woodbury.

The plan to sell the government houses constructed in munition centers during the war will affect Waterbury greatly, since nearly 50 houses will thus be thrown on the market here. Long time payments, to make it possible for present tenants to own their homes, will be encouraged.

L. M. P.

WATERBURY, CONN.

SEPTEMBER 8, 1919.

Members of the local union of unskilled laborers here affiliated with the A. F. of L., are protesting that the manufacturers are discriminating against the officers of their union. Carlo Capozza, of the Scovill Mfg. Co., president of the union, says that he has lost his position as the result of his association with the union. John H. Goss, superintendent of the Scovill Mfg. Co., denies this statement.

Members of the union have donated enough to pay Capozza during the time he is out of work. They say he will take steps to back up their protest if the manufacturers do not heed their complaint. At present there are over 700 unskilled workers in the union.

Organized labor here held a monster mass meeting against prohibition on the 19th. State Senator John J. Kearney and Attorney C. J. Danaher, of Meriden, with several of the local labor leaders, voiced strong protestations against prohibition, and hinted at drastic measures to be taken by labor to restore the license.

John P. Elton of the American Brass Co., has been appointed to the Chamber of Commerce of the United States on a general committee of arrangements for the international trade conference which will be held at Atlantic City during the week of September 29.

James P. Donahue, a representative of the Central Labor Union, has been appointed on the fair price committee of the state to aid in the investigation of the high cost of living.

Employes of the Scovill Mfg. Co. will hold their annual Get-Together Day on September 13. The program will consist of athletic events and a social time.

The new factory building, 220x60 of the H. C. Cook Co., Ansonia, Conn., which is now under construction, will probably be completed by Nov. 15th. It includes a tool room, grinding room, plating, stamping and polishing departments. D. P.

NEW BRITAIN, CONN.

SEPTEMBER 8, 1919.

The advent of the New Britain Machine Company into active work in construction of motor tractors for farm work is the most important development in the metal manufacturing situation in this city. The initial production order, on which work has been started, called for the immediate construction of 2,200 tractors. These machines are of the small farming type. They are not of the heavy type made by the big harvesting machinery concerns, but are designed for use by the small farmer. They are operated similar to the old fashioned plow, in that the tractor attaches to the machinery and draws it along, while the operator walks along in the rear, guiding and operating it in that manner. The officials have not yet definitely fixed upon a price, but an attempt is being made to sell it under $300. Present plans call for a special corps of salesmen, who with a specially designed motor truck, will tour the southern states this winter, taking orders and selling the tractors. This sales force, moving steadily through the country, will swing northward in the springtime and will tour the northern agricultural states in time to interest the farmers next spring.

Should this present tractor prove the success which is expected, the plant will later branch out with a newer and more powerful machine which, when designed and completed, will vie with the big farm tractors and machinery already on the market. These contemplated machines will be big enough to seat the operator and will have a more powerful motor than the first lot.

At the other factories, business remains about normal, with each concern working on a full schedule. At the P. & F. Corbin factory and the Russell & Erwin plant, both divisions of the American Hardware corporation, big orders are being received for builders' hardware, such as transom rods, door checks, door fasts, knobs, escutcheons, catches, etc. At the North & Judd Manufacturing Company and also the Traut & Hine Manufacturing Company work continues on novelities, buckles, snaps, etc., and at the Union Manufacturing Company and the Skinner Chuck Company dies, chucks and other mechanical products are turned out. Landers, Frary & Clark continues to expand and its production of cutlery, household utensils, travelling kits, etc., is more extensive than ever. The Stanley Rule & Level Company likewise has sizable orders, both from jobbers and big concerns, for carpenters' and builders' tools, such as hammers, saws, mallets, levels, etc.

The Stanley Works, manufacturers of cold rolled steel and wrought steel butts and hinges, is handling big orders and the Hart & Hutchinson Company, as well as the Hart & Cooley plant, makers of all kinds of lockers, are doing a good business. The stimulus recently given the automobile trade as well as other lines of industry requiring smooth running machinery, has benefited the Fafnir Bearing Company, where ball bearings of a very high grade are made. Its orders this summer are bigger than ever before.

Regarding the labor situation, it might be called almost normal here. There is not a great excess of labor seeking employment, but neither is there a great shortage of help and things

are proceeding smoothly. New Britain has ever been regarded as an "open shop" city and thus far the various trade unions have been unable to obtain any great foothold here. At the present time the labor situation is quiet. H. R. J.

HARTFORD, CONN.

SEPTEMBER 8, 1919.

Lieutenant Jeanjean and Messrs. Krebs, Henze, Servois and Dolify, comprising a special industrial mission from Belgium, are in Connecticut, making a tour of inspection of factories throughout the state. Captain Anson G. McCook, of Hartford, who returned recently from overseas service, was appointed by the Manufacturers' Association of Connecticut to accompany the members of the mission on their visits to plants in the Nutmeg State, and to act as an official representative of the association. The mission visited factories in Hartford, New Haven, Bridgeport and Waterbury, making a four days' visit, and allotting one day to each of the cities. They arrived in Connecticut on Wednesday, August 27. Among the Hartford factories which they visited were the Colt Patent Fire Arms Manufacturing Company and the Pratt & Whitney Company. Secretary Thomas J. Kelley of the Manufacturers' Association of Hartford County was in charge of the arrangements for showing the visitors through the shops in the Capital City.

Because of a strike of some workmen at the plant of the Underwood Typewriter Company, the entire plant has been closed down for some time.

Charles D. Rice, factory manager of the company, issued a statement August 25, in which he denied stories to the effect that he had refused to talk with a Federal conciliator and charges made by union leaders that a blacklist is being operated against the strikers. His statement follows in part:

"The statement that I refused to discuss matters with the employees is absolutely false, as A. P. Krone, chairman of the press committee, is fully aware of, because he, when an Underwood employee, with a number of associate workmen, sat in conference with myself and others of our organization.

"In regard to the allegation that former employees of the Underwood Company are being prevented from securing work in other plants, there is no justification in fact for such assertions. After the signing of the armistice, a number of local plants were compelled to reduce their working force to such an extent that between 6,000 and 8,000 operatives were laid off. This afforded an opportunity for other plants in the city to secure sufficient help to meet their requirements. In view of this, it would have been impossible for local factories to employ the more than 4,000 operatives who became unemployed because of the shutdown of the Underwood plant. It develops, however, that a considerable number of these employees have found work in local plants, one factory having already given employment to 21 persons."

John T. Underwood, president of the typewriter company, has been in the city, consulting Mr. Rice, who said that there was no particular significance to the visit.

The news of the President's decision in the case of the railroad shopmen was not received with enthusiasm in Hartford. Many of the former strikers declared that they had been treated unfairly. Some of the men employed in the railroad yards in East Hartford said that they were not satisfied with the award. The sentiment expressed here was that the workmen would not accept the award and it is probable, according to indications at this time, that a committee will be sent to New Haven to confer with men from the entire system.

The workers in the Riverside woolen mill in Stafford Springs, who went out on strike August 20, returned to their work on the morning of August 26. They had demanded a 15 per cent. raise. William Park, owner of the mill, offered the workers of the spinning department $22.50 a week, and an equivalent increase to other workers, and the offer was accepted.

In announcing that the motormen and conductors employed on the Hartford & Springfield Street Railway Company lines had accepted an increase of 12½ per cent. in salary, offered by the company, Harrison B. Freeman, receiver, paid tribute to the attitude of the workers, explaining that there had been no trouble of any kind and that the company appreciated the efforts of the workmen.—W. A. L.

TORRINGTON, CONN.

SEPTEMBER 8, 1919.

The Bridgeport Castings Company of Bridgeport was incorporated during the last month with H. B. Houghton, formerly of the sales department of the Turner & Seymour Company as president; Edward P. Quinn of Torrington as secretary and treasurer; and Messrs. Houghton and Quinn and W. H. Monagan of Waterbury; U. G. Teetsell of Tarrytown, N. Y., and John S. Pullman and T. R. Good of Bridgeport as directors. The authorized capital stock is $100,000 and the company begins business with $75,000 paid in. E. W. Morgan, who was employed at the Turner & Seymour plant for 31 years, being foreman of the brass castings department most of that time, is superintendent of the new foundry.

Two carloads of army food were ordered for sale in Torrington to help the workers meet the high cost of living. George H. Atkins, secretary of the Employers' Association, was in charge of the ordering and distribution.

The carpet sweeper department of the Torrington Company has begun a nation-wide campaign advertising its products.

Employment and home service departments have been organized by the Torrington Y. M. C. A. to aid both the employers and persons seeking employment.

The freight embargo caused by the shopmen's strike on the New Haven road during the past month caused slight inconvenience in several of the metal working shops, but fortunately the embargo did not last for any length of time, and no curtailment of work was necessary.

There have been no labor troubles in Torrington during the month. Practically all departments of all the plants are working full time, and wages are high.

Frederick H. Baldwin, for many years in charge of the wood department of the Coe Brass Branch of the American Brass Company, has given up his work on account of the curtailment of that department owing to the substitution of oil for wood to a great extent in manufacturing purposes. Mr. Baldwin has become superintendent of the Litchfield County Realty Company.

Clifford W. Post with his wife and child sailed several days ago for England to become superintendent of the Torrington Company's plant at Coventry. Mr. Post was a foreman at the Excelsior Needle plant in Torrington for several years. His fellow-foremen just prior to his departure for overseas presented to him a purse of $150 in gold as an evidence of their appreciation of his friendship.

The Torrington trade school is building a cutting off machine for the Fitzgerald Manufacturing Company, and oiling attachments for the Excelsior Needle plant, and is drawing patterns for the Standard and Excelsior plants and the Turner & Seymour Manufacturing Company.

LOUISVILLE, KY.

SEPTEMBER 8, 1919.

Business with the Louisville coppersmiths and metal working trade continues good, every shop being busy, but just how long business will continue on a full time basis is a question. During May and June building operations were heavy, but in July they slacked off, and August was a comparatively dull month. Efforts to stimulate building operations have been undertaken, but a big publicity campaign was voted down. Practically all brass and copper goods now produced are going into industrial work of some sort. A few concerns are still busy on war orders that they are winding up. A few are working on acid plants of one sort or other. There is a good demand for automobile equipment, but plumbing goods are not nearly as active as had been expected, due to the slump in building.

Leading jobbers of plumbing supplies report that they are experiencing difficulty in securing supplies, as mills were short on stock, and haven't been able to supply demand, which at that was under normal. A. Vogel, of the house of P. A. Vogel & Sons, jobbers of plumbers and steam fitters' supplies, reports that he has had considerable difficulty in securing brass as well as iron and steel goods.

The Belknap Hardware & Mfg. Co., Louisville, recently purchased the old Galt House hotel property and other property, which will be torn down to make room for another large warehouse. In this deal the company also purchased the property occupied by P. A. Vogel & Sons, and will tear down that building. The latter company has purchased two buildings at Second and Main streets, which will be remodeled into a larger and better house.

A strike of nearly 1,000 employes of B. F. Avery & Sons, manufacturers of farm implements, occurred in the last week of August, the men striking for a twenty per cent increase. The company offered a ten per cent increase, which was refused.

Louisville has been badly torn with strikes during August, 1,300 employes of the Louisville Railway Company going out, resulting in much difficulty in getting employes of other companies to work. Many houses hauled their employes in trucks and pleasure cars. The strike has been in effect for more than two weeks, and has been accompanied by a good deal of rioting. However, the company is managing to operate about a hundred cars, and refuses to deal with the union.

Moulders and machinists as well as electrical workers have been out in several plants, asking for shorter hours, increased pay, and closed shops. Practically all of the machinists are back, and most of the electrical workers. Employers won a garment makers' strike, a telephone strike, and it looks as if they will win the balance. Printers, bakers and a few other trades are still out, but the printers and bakers are badly beaten, and the employers are going right ahead.

Louisville has never been a well organized union city, and employers have always held the upper hand, and are not giving in materially in the present crisis.

A new union of copperplate printers and engravers has recently been organized in Louisville, but to date has not taken up any labor matters with employers.

MONTREAL, CANADA

SEPTEMBER 8, 1919.

Conditions amongst the manufacturers of non-ferrous metal goods have shown a decided improvement this month, compared to the spring of this year.

There is a better tone in the labor market, as all industrial disputes have been settled amicably.

Metal using concerns are buying supplies very sparingly, as they are expecting foundry supplies, also polishing supplies to take a drop in price this fall.

The northern Electric Co., large manufacturers of electrical brass and copper finished goods, are running to full capacity.

The manufacturing jewelers are all very busy at the present, and Farmer Bros., located at St. Lawrence Boulevard and Craig street, whose specialty is rings, have some large orders from the west on hand. Rubenstein Bros., Craig street brass founders and finishers and gold, silver and nickel platers, are very busy at present on general lines of jobbing work. P. W. B.

WORCESTER, MASS.

SEPTEMBER 8, 1919.

No marked improvement in the labor situation has been noted in Worcester during the past month, though many of the manufacturing establishments have cut the hours of labor and increased pay which undoubtedly saved them strikes. However, at the time of writing, there are several strikes on in the city of no mean importance.

The molders are still out, making three months that the foundries have been operating with green and inexperienced help in many cases. Not a few of the factories formerly having castings made in Worcester have found it necessary to send elsewhere to have the work done. The legal part of this strike, which has been in the courts for about two months, is not yet over. The legal proceedings are featured by injunction actions which the foundry owners brought to "enjoin the strikers from interfering in their businesses." It is expected that lawyers will make their final arguments in the cases this week, but the reports will be so voluminous that it will be another month before all of the evidence gets to the court, as the case has been heard before an auditor.

Two hundred and fifty employes of the Worcester Machine Screw Co. are on strike for less hours and more pay. The men have been working 55 hours each week and recently were put on a 50-hour-a-week schedule. They want 55 hours pay.

One hundred employes of the Worcester Woolen Co. also are on strike. They want $4 a day instead of the $18 a week they have been receiving as weavers.

The Baldwin Chain and Manufacturing Co., just at present one of the city's busiest manufacturing companies, largely because of the automobile boom, they making sprockets, etc., has awarded its help a 10 per cent. voluntary increase in salary.

One of the city's newest companies which uses a vast amount of plating materials and metal, the Auto Curtain Glass Co., is rushed with orders and finds it necessary to move to new quarters. These have not yet been secured, but within two months after getting started the company has greatly outgrown its present quarters and is forced to leave the premises with about $4,000 worth of improvements behind.

During all the labor trouble there has been in Worcester the city's biggest industry, the wire industry, the shops of the American Steel Wire Co., have experienced no trouble. All of these shops are running full tilt, many of the departments nights. The same has been true of the plants of the Clinton-Wright Wire Co., which recently figured in a big merger, and which is now one of the largest corporations in the East manufacturing wire specialties.

The latter company is planning additions to its Palmer plant of great size. It may be several months yet before the start on this work is made, but it is understood that plans are already in the hands of the architects. The company has large land holdings in Palmer and some excellent sites for the expansion of the business, which was started there by the Wright Wire Co. branch of the new corporation several years ago.

This company is now at work in its fine brass weaving departments experimenting on the manufacture of airplane cloth. This cloth is made of bessemer steel wire and cotton thread. The warp is two-thirds cotton and one-third steel. The wire is .005 in the warp and .007 in the filling. The woven product is electro galvanized in the galvex department of the Worcester plant, and makes a firm and durable fabric. It is proposed to use this cloth for the wings of aeroplanes, the idea being to produce a non-inflammable aeroplane, beside insuring the wings and other cloth parts against tearing.

The plant of the Diamond Tack and Nail Co., 35 Lagrange street, is handicapped because of the strike of tackmakers there. The management of the shop states that the factory has been closed until the employes feel like returning to work. There are about 200 tackmakers in New England, but there are a large number in Canada, and altogether it is believed that through the tackmakers in all tack shops striking about 3,000 hands have been thrown out of employment. Every tackmaker in the Worcester shop was making $50 a week, the management claims, and the shop recently gave the eight-hour day. The tackmakers are after a weekly increase of $4 and a cutting down of the running capacity of the machines to one-half. This actually means a $4 increase with one-half of the old production.

Charles E. Hildreth, long identified with the machine tool business in Worcester, has been called upon by the government to assist in the sale of the surplus machinery which the government collected for use during the war. The assortment of machinery in the sale of which the Worcester man is having a prominent part is valued at $250,000,000.

Most of the machine tools which the government now has on sale were used during the war in shops operated by the signal corps, air service and ordnance departments. Mr. Hildreth is given much of the credit for devising the system to handle the biggest marketing proposition the government has ever started in the machinery and machine tool line. Experienced in practical business methods, the Worcester man showed the government officials how the machinery could be handled with profit both to the buyer and the seller. Under the old system from 10 days to three months was used up in the examination of bids for the sale of much of the machinery. The new system provides for blanket clearances, whereby all surplus tools in the possession of the government are for sale in about 50 district offices maintained by the air service, signal corps and ordnance department.

The new system has been approved by Secretary of War Newton D. Baker and will be put into use at once.

TRENTON, N. J.

SEPTEMBER 8, 1919.

The Trenton metal industries are running smoothly as far as the labor situation is concerned and the manufacturers are not expecting any labor trouble in the near future. Plant owners, of course, never welcome labor troubles and like to work in harmony with their employes. Strikes not only delay orders, but also frequently cause bitter feelings between the management and men. The employes of but one metal plant have made any demands during the past summer. The employes of the Jordan L. Mott Company recently asked for a slight increase in wages and the company readily granted the same before any threats to strike were made. The big company not only granted the demands of the employes, but also put the working force on the regular working hours again. Following the cancellation of war contracts the corporation reduced the working hours and this also meant a cut in wages. With the increased hours will come an advance in the wages. Business at the plant is beginning to pick up and the company looks for a busy winter.

Metal manufacturers believe that the widespread movement of Americanization will greatly aid the industries and lead to better feeling between American and foreign employes. Lectures on the subject are given frequently to foreigners of different tongues and they are given to understand that they must do as Americans do. Heads of some of the big metal plants have agreed to give their time to the cause and feel that if foreigners became Americanized there would be less labor troubles in the shops. William C. Hipple, general manager of the Westinghouse Lamp Company, and William A. Anderson, general superintendent of the John A. Roebling's Sons Company, are two prominent men who are interested in the movement.

Trenton metal manufacturers are optimistic over the future and one big concern is going to build a large sized addition. The Ingersoll-Trenton Watch Company has awarded a contract to the Aljon Construction Company of New York City for the erection of a brick and steel addition to the plant on Monmouth street. The building will be one and a half story high and 99 by 21 feet. The addition will cost $13,000. The new structure will be built to provide for the increasing volume of business of the concern, which has grown rapidly during the past season.

The company recently had to go to considerable expense in renting a modern dwelling for the purpose of giving instructions to pupils in the art of watchmaking.

Charles W. Carll's Sons, of 3 West Front street, has awarded a contract to James H. Morris & Company, for the erection of a one-story brick and steel factory on Stuyvesant avenue to be used for manufacturing. The new plant will be 150 by 50 feet and will cost $10,000. The John A. Roebling's Sons Company has been granted a permit for the erection of a two-story office building and stock room on South Clinton avenue to cost $20,000. Three dwelling houses will be razed for the erection of the new addition.

Metal Stamping and Manufacturing Company, of Newark, N. J., has been incorporated with $100,000 capital to deal in stamped ore and manufacture the same. The incorporators are Harry F. Green, Sali Kneip and N. M. Frutchman, all of Newark, N. J.

James H. Bigelow, 81 years old, formerly manager of the New York branch of the Ladd Watch Company, died on August 16 in the Elizabeth General Hospital, Elizabeth, N. J. He was ill but a day and died suddenly. His home was at 559 North Broad street, Elizabeth, N. J.

John Prentice of 439 Carteret street, Camden, N. J., has been awarded the contract for the official medals to be presented by the State of New Jersey to the soldiers, sailors and marines who served in the recent war. The medals will cost $25,000. The state will purchase 60,000 of the medals.

Clarence H. Sparrow and Louis H. Lothle were arrested recently on the charge of stealing $80,000 worth of gold from the plant of the Balbach Smelting and Refining Company at Newark, N. J. They were held under $25,000 bail each.

Joseph Y. Clark, formerly head of the Clark Brothers' Lamp and Brass Company, Trenton, N. J., died recently in the Episcopal Hospital, Philadelphia, after an illness extending over a period of four years. His brothers, Peter K., Frank B., and the late Charles Clark, were in business with him, and the company operated one of the largest lamp and brass companies in this section. The company made lamps and disposed of them at their stores. Joseph Y. Clark was 60 years old, and was born and raised in Trenton. The brass company went into bankruptcy some years ago.—C. A. L.

ROCHESTER, N. Y.

SEPTEMBER 8, 1919.

Business conditions among Rochester's industries are quite the same as when last reported. All through the present month every manufacturing plant in the city has been producing to its utmost, and superintendents do not hesitate to admit that "business is booming."

One thing, however, tends to interrupt and delay the development of the biggest industrial era in the history of the city, and that is the poor shipping facilities that at present afflict this locality. There is no difference in the matter of delay, as freight shipments, either in or out of the city, are no better than that furnished by the express companies. Manufacturers are looking forward to the time when railroad men will cease their bickerings over wages and the manner in which the roads shall be conducted, and the Government will turn the roads back to private ownership. The war is over, and the great public utilities back in the hands of their owners, will tend to bring about normal conditions and industrial adjustment.

There is not a big manufacturing plant in Rochester, particularly one that requires large quantities of metals, but suffers the handicap presented by inefficient freight and express shipping service. Orders are reaching Rochester concerns day after day, the bulk of which are accepted subject to delay. This continuous performance in the matter of "delay" is becoming exasperating. It means the holding back of production, of course. In spite of this state of affairs, the Eastman Kodak Company is employing 1,000 more persons than it did when the United States entered the war against Germany.

Copper and brass materials are in strong demand in Rochester, but owing to the railroad situation, the supply is difficult to obtain. Brass sheets and rods are scarce, and dealers insist on shipping scrap brass instead of the other product. Copper was quoted at 23 cents here to-day, a price that has been stationary all month. The same situation exists as regards aluminum. The metal is in great demand, and the supply limited. The automobile industry is responsible for the aluminum shortage, of course. Spelter is higher and firmly held. Tin is in fairly good demand, but deliveries are not good.

Rochester has been going through the experience of many other American cities because of the unrest of labor, and the activity of the professional agitator. The latter element includes a large proportion of persons of foreign birth, who slyly avoid civil and federal authorities by appealing to their fellow countrymen in their own language and through their own subterranean methods of doing business.

The strike at the Bausch & Lomb Optical Works has been a serious affair, at one time more than 2,500 workingmen being out. The larger number of the strikers are of the unskilled sort, Polish, Lithuanian and Italian laborers. A few hundred machinists and better class men joined the movement, which is gradually petering out. Much violence occurred, but the police were able to cope with the situation and prevented attacks on the property. The strike affected the making of glass lens and metal parts to the extent that certain local industries dependent on the optical company for their supply, were handicapped for the time being. The optical works use a tremendous amount of all varieties of metal in the course of a season, and give employment to more than 5,000 employees.

The moulders' strike is still in progress. The foundries have employed much non-union help, but foreigners have mostly been taken into the shops and their work is far from satisfactory, except in spots.

The Eastman Company is erecting a large new office building in Platt street, immediately adjoining its State street structure. It is seven floors in height, and will hold all of the offices now housed in the older structure. The latter building will receive an additional department of the ever-augmenting kodak plant.

G. B. E.

LABOR TROUBLES AT ROME, N. Y., SETTLED

SEPTEMBER 8, 1919.

The strike of metal trades workers of this city, involving upwards of 4,000 workmen and running more than two months, has been brought to a harmonious conclusion through the efforts of the New York State Industrial Commission.

The commission, headed by John Mitchell, former president of the United Mine Workers of America, came to Rome on August 4, and at once entered into conferences with the employers and workers in separate sessions, but no agreement was reached. The commission then held an open hearing in the court house at which both parties to the controversy were heard. The case of the workers was presented by William Collins, representing the American Federation of Labor, aided by witnesses from among the strikers, and the views of the manufacturers were set forth by executive officers of the various plants involved. Although the commission was unable to bring about an immediate settlement of the differences, it paved the way for the agreement which was brought about one week later.

During the conferences with the commission the manufacturers submitted a plan of settlement, which, while not immediately acceptable to the workers, was finally approved by the strikers, after certain amplifications had been made by the employers.

The men returned to work on Wednesday morning, August 13.

Briefly stated, the settlement establishes a 50-hour working week and an increase in wages to offset bonuses, which have been discontinued. The men asked for a 48-hour week. It is entirely fair to say that the manufacturers, in their posted notices to employees and communications to the State Industrial Commission, showed a splendid spirit of fairness in their negotiations with their employes, and their example may well be emulated wherever labor trouble exists.

Some of the terms of settlement in brief were as follows:

Wages and hours to be based on the wages and hours of competitors of the Rome plants. Such scale of wages and hours to be established within two weeks after the time the men returned to work, and the wage scale to be retroactive for one week. Such scale to be submitted to the State Industrial Commission to be checked with competitors' conditions and wages.

In accordance with their agreements, following investigations as thorough as was possible to make during the intervening time, the manufacturers posted notices on August 26 of scales and wages and schedules of hours, which, it is claimed, meet the demands of the men, as most of the employes have expressed themselves as satisfied.

Some days prior to the posting of the notices, the employes of the Rome Brass & Copper Company, by request of the company, held a formal election during working hours and elected a committee on the basis of two committeemen for every 100 employes or fraction thereof, in each department. The election was by ballot and every employe present was entitled to vote. The purpose of this committee was to meet the management when it had compiled the figures, along the lines mentioned in the company's proposal to the Industrial Commission, which the men had already accepted, so that the figures could be explained to them in detail, and the committee could be shown how they were arrived at, and the men, in turn, could explain them to all employes. The men had the privilege of asking any questions which they deemed fit, explanatory to the figures in question.

The terms agreed to by the Rome Brass & Copper Company and their employes were posted in the mills as follows:

We have compiled our figures as nearly as we can get them from our competitors in regard to hours and wages. We find that the average of the actual working hours per week of our principal competitors is between 54 and 55 hours per week. Therefore, according to our proposal, we can, if we wish, run 55 hours per week, namely 10 hours per day for 5 days and 5 hours on Saturday. However, some of the other mills in town are only going to run 50 hours per week, and therefore for the present our hours will be as stated below:

On and after August 27, 1919, and until further notice, the hours in our mills will be as follows:

West Mills.—Monday, Tuesday, Wednesday, Thursday, Friday, 7 a. m. to 12 m.; 1 p. m. to 5 p. m.; Saturday, 7 a. m. to 12 m.

East Mills.—Monday, Tuesday, Wednesday, Thursday, Friday, 7 a. m. to 12 m.; 12:30 p. m. to 4:30 p. m. Saturday, 7 a. m. to 12 m.

The wages which were to be retroactive for one week, which would make the new wage rate go into effect August 20, we have decided to make retroactive from August 18. In other words, the matter of wages will be retroactive from the beginning of the week, or August 18, but the hours will be put into effect on August 27.

Watchman, guards, etc., will work the same number of hours which they have in the past.

Our hourly rate for common labor to men at present employed will be 44 cents per hour.

To other employes of classes above the class of common labor, who have not had their wages advanced since June 9, 1919, we will make individual advances of approximately 20 per cent.

Piece rates which have not been advanced since June 9 will be advanced 20 per cent. Your foremen will advise each of you individually at once, or as soon as practical, your new rate.

Five per cent. attendance bonus will be discontinued.

Strictly emergency work, such as necessary repairs, or work of such urgency that it must be done after hours, will be paid for at the rate of time and a half after the regular established hours per day, and on Sunday and holidays, namely, New Year's, Decoration Day, Independence Day, Labor Day, Thanksgiving and Christmas, will be paid for at the rate of double time.

We have explained our figures to your committee, which you elected for that purpose, and we believe they can assure you that we have gone strictly in accordance with the proposal made with the Industrial Commission, and in some instances have treated you more liberally than we agreed.

Rome Brass & Copper Co.,
(Signed) B. Haselton,
General Manager.

The Rome Hollow Wire & Tube Company posted the following notice:

In accordance with our agreement, we will put into effect, commencing Wednesday morning, August 27, 1919, the following schedule of hours:

Monday, Tuesday, Wednesday, Thursday, Friday, 7 a. m. to 12 m., 12:30 p. m. to 4:30 p. m.; Saturday, 7 a. m. to 12 m.

Each employe will receive an increase in his rate per hour. This increase will be approximately 15 per cent. for common, unskilled labor. Other men will receive increase in about the same rate. The minimum for men now in our employ will be 46 cents per hour. Each individual employe can get his rate from his foreman.

According to agreement, the wages were to be retroactive one week, which would make wages go into effect August 20. We have decided to make them go into effect August 18, in other words, wages will be retroactive from beginning of the week of August 18, but the hours will be put into effect August 27.

Rome Hollow Wire & Tube Co.
August 25, 1919.

The Rome Manufacturing Company sent a communication, of which the following is an abstract, to the State Industrial Commission and posted copies in their mills:

The following will become effective in the two plants of this company on the dates stated:

First—The average number of hours per week of the principal competitors of this company, as nearly as can be determined, is 51.43 hours. To be perfectly fair, the two plants of this company will establish a week consisting of 50 hours.

Second—All bonuses will be discontinued. Piece work rates and rates per hour will be so adjusted as to cover the

10 per cent. attendance bonus now in force.

Third—Men working on production work on night shifts will be paid on an average of 10 per cent. more, either on an hourly or on a piece work basis, than men working on production work daytimes.

Fourth—Piece work rates will be adjusted to make it possible for skilled employees to earn average earnings as covered by the hourly rates established for the different classes of work as mentioned below.

Fifth—the company will in the future, as in the past, discuss with its employes, at any time, matters of mutual interest.

Sixth—Wage Scale, Plant No. 1:

Toolmakers, 65c. to 78c. per hour—average 75c. per hour.

Machinists, 60c. to 75c. per hour—average 65c. per hour.

Platers and buffers, 55c. to 70c. per hour—average 62½c. per hour.

Solderers, 50c. to 65c. per hour—average 57½c. per hour.

Machine operators, 40c. to 65c. per hour—average 50c. per hour.

Unskilled labor and helpers, 40c. to 45c. per hour—average 41c. per hour.

Female machine operators, 25c. to 40c. per hour—average 30c. per hour.

Other female helpers, 20c. to 27½c. per hour—average 22½c. per hour.

On machines where both male and female operators are employed, equal pay will be paid for equal work.

Seventh—Plant No. 2:

As far as known, this is the only contract plant in the country devoted exclusively to locomotive repairs, hence comparison with competitors is impossible. The 50-hour week seems to be prevalent in plants building locomotives, and the wage scale approximately the same.

In Plant No. 2, effective on the dates above mentioned, the 50-hour week will be put into effect, and the wage scale remain as at present, with the exception that it will be adjusted upwards to equal the 10 per cent. attendance bonus now in force.

Individual adjustments of daily rates will be made in the future as in the past.

Yours very truly,

Rome Manufacturing Co.,

P. C. Thomas,

General Manager.

The following is an abstract of the schedule of hours and scale of wages posted at the Rome Wire Company, a copy being sent to the Industrial Commission:

1. Regular weekly hours of labor for all day shifts shall be 50 hours per week; night shifts 55 hours.

2. Day rates and piece work rates.

Owing to the many different prices paid for the lengthy list of articles on the piece work list, the rates posted in the factory are here omitted.

3. Men working on night shift will receive 10 per cent. extra for night work.

4. Increased wage rates, as above listed, will become effective on August 25 and employes who were either continuously in our employ from June 4 to August 25, 1919, or came to work for us at any time between June 4 and August 25, will be paid the increased rates for one-half of the period they worked, between June 4 and August 25.

Only through the good will and co-operation of all of our employes can we hope to operate a successful business and be able to maintain high wage scale. We believe it is to the interest of all, if our past differences are forgotten and all of our employes, and each person connected with the management of our company, work about to bring about mutual good understanding and good will.

Yours very truly,

Rome Wire Company.

At the plant of the Spargo Wire Company it was stated that the men returned to work; that they have been granted an increase in wages and are satisfied, and that there was nothing to give out for publication. M. J. D.

CINCINNATI, OHIO

SEPTEMBER 8, 1919.

The outlook for the metal trades industry in Cincinnati and vicinity is everything that can be desired. The market has assumed a more steady position with regards to all kinds of metals and products and there appears an air of optimism.

During the past month prices have fluctuated somewhat with a tendency for higher levels, but the general feeling is one of steadiness with a firm undertone.

Labor conditions, while not wholly the best, are apparently somewhat more satisfactory than they have been. The past month saw the settlement of labor troubles at several of the larger mills in this vicinity and work now is being resumed all along the line.

There is some difficulty being experienced by dealers to obtain the finished products from the mills, but they believe that this condition will be relieved as the fall season gets in full swing. Many orders that have piled up at the mills during the recent labor trouble now are receiving the attention they should have had some weeks ago. The mills are clogged with work and with the resumption of labor conditions back to their normal once more the members of the trade say they have every reason to believe that all adverse conditions will be cleared up within a comparatively short time.

The Metal Polishers' International Union is holding a two weeks' convention in Cincinnati. Many important problems are being considered by the organization. The convention at one of the sessions definitely defined its attitude toward political parties. It had been asked to indorse the so-called "American Labor Party." It refused this indorsement. President W. W. Britton said that it was not to be understood that the convention was opposed to the "American Labor Party."

"All our action signified is a policy of 'hands off' in politics," said Mr. Britton. "We have not indorsed the Republican, the Democratic or the Socialist party, because of this settled purpose not to mix trades' unionism with politics. As an organization we are neither for nor against any political party."—C. T. N. B.

CLEVELAND, OHIO

SEPTEMBER 8, 1919.

Fall activity in the various branches of the metal industry already are under way here. This is largely due to the fact that practically every branch of manufacturing, even remotely connected with the industry, in the Northern Ohio territory, is planning the expansion of its business. Foremost among these is the automobile industry, which, for the most part, proposes to bring out the 1920 cars earlier this year than usual. Large orders for parts and material already are being placed by these firms. The building industry, which, in the matter of building and plumbing hardware, will now require large quantities of these materials, is moving ahead with spring-like fervor, and the possibility of a slump in building, even during the mid winter, now seems remote. Much building has been held up for lack of basic materials, such as lumber, tile and brick. These now are beginning to come through with some degree of regularity, and the immediate finishing of much housing and other structures is under way.

One of the largest projects locally to get an actual start is the L. M. Axle Company, recently incorporated for $1,500,000, and which proposes the construction immediately of a plant, which, with equipment will cost $600,000. Leo Melanowsky, inventor of the new process, will be chief engineer. Other officers are: President, H. E. Shimmins; Vice-President, Capt. R. L. Queisser; Secretary, James L. Vaughan; Treasurer, Louis A. Otto. Temporary offices have been established at 247 Colonial Arcade.

The Kennedy Company, plumbers supply interests, plan the construction of a $100,000 building at Prospect avenue and East Nineteenth street. Copper, brass and allied interests in the metal industry will have greater resources for their raw material from at least one point, following the completion of plans by the Merchant and Evans Company for Cleveland. Excessive demands upon this firm, especially for

sheet materials in the last few months, has necessitated enlargement of warehouse facilities. The present warehouses are at 315 Champlain avenue. These will be augmented by another building, at 410 Champlain avenue, recently leased, and which is not taking stock. According to J. C. McElroy, district manager, this will give this firm in this territory 100 per cent. increase in stock available for immediate delivery.

One phase of cooperation between members of the industry and their employes, in connection with combating the high cost of foodstuffs is developing rapidly here in the establishment of company stores at large plants, or the outright purchase of merchandise, to be sold at cost to employes. Both plans are in effect in a dozen or more such establishments, and it is believed the further spread of this activity will materially reduce the costs of foods generally in this section in the near future. Firms that have already joined this movement are the National Lamp Works, the National Carbon Company, the American Multigraph Company, the Willard Storage Battery, the Cleveland Twist Drill Company, the Cleveland Hardware Company, the White Motor Company, the Hydraulic Pressed Steeel Company.

Word of the removal of the Czecho-Slovak commission to Cleveland, as a more central location in this country to make its purchases, is received here with much interest by the metal and allied industries. No confirmation has been received of this report as yet, but if the commission does come to Cleveland it will not only have a better opportunity to make purchases, but the outlet for semi-finished and finished product will be increased.

Another project that will mean tremendous demand upon the different branches of the industry in the Cleveland district, is the proposal of the Willys-Overland, Inc., to establish a mammoth plant at Elyria, about 12 miles distant, for the production of Knight automobile motors and engines for house lighting. About 100 acres has been purchased on the outskirts of Elyria. The plant is expected to employ about 9,000 men, and it is estimated will require at least $5,000,000 machinery for equipment alone. Local Overland interests have not been able to confirm this report as yet, however.

George T. Trundle, Jr., chief engineer of the American Multigraph Company, has resigned from that firm to become a consulting engineer. He has opened offices in the B. of L. E. building here. He will specialize in machine designing. During the war Mr. Trundle became a national figure as the inventor of machines for munitions production.

While satisfactory adjustments of difficulties between employing factions and labor have been reached, this has not settled the labor question here by a great ways. In other words, the city is short of labor, and not a little of this is due to the inability of labor to find living quarters when it does arrive. With a view toward obtaining enlightening information on this phase of industry, many members of the metal trades attended the meeting at Hotel Statler, which was addressed by R. M. Little, director of the Safety Institute of America, and learned that America's man power is about 5,000,000 men, and that the world is short 25,000,000 men, all of which it would have had if the war had not taken place. It is because of this fact that Mr. Little's organization is extending every effort to improve the safety first movement, he said. It is his opinion that conferences of employers and workers regarding safety devices and safety programs will tend to smooth out many difficulties before difficulties arise. Mr. Little appeared here in one of a series of talks he is giving all over the country preparatory to the safety congress to be held in Cleveland next September.

Not a little of the demands upon the metal industry will find outlet in new construction. The Republic Motor Truck Company, capitalized at $18,000,000, plans to center its industrial expansion in this city. The statement is made by J. O. Eaton, vice-president of the company, with headquarters for the present at Alma, Mich. Mr. Eaton is president of the Torbensen Axle Company, a subsidiary of the Republic. The company also controls several other interests related to truck manufacture. It has just acquired 76 acres of land in the extreme easterly factory section of the city, upon which it will start its expansion movement. Executive offices will be brought to Cleveland at once, according to Mr. Eaton. The present output of 75 trucks a day will be greatly increased by the fulfillment of these plans. J. H. Foster, president of the Hydraulic Pressed Steel Company, is president of the board of directors of the Republic.

C. C. C.

COLUMBUS, OHIO.

SEPTEMBER 8, 1919.

The metal market in Columbus and central Ohio territory is fairly strong, although buying is not quite as active as was the case a month ago. Prices have ruled steady during the month and as a result there has been no wide range in quotations. The whole tendency is toward steadiness in contrast to the active demand which characterized the trade sometime ago.

All metals are fairly steady with the possible exception of aluminum which is showing some weakness. Stocks in the hands of metal using concerns are larger and orders which are now coming in are for present needs only. Brass is fairly active with quotations around 17 and 17½ cents for yellow and 19 cents for red scrap. Copper is steady at 21½ to 22 cents. Zinc and tin are moving fairly well and the same is true of lead. Type metals still continue strong and the demand is holding up well.

No strikes of importance have disturbed industrial conditions in the Buckeye Capital. Outside of some minor labor troubles, labor is apparently satisfied. This is especially true among concerns which are large metal users. Wages are still high and there is no special plan adopted to handle labor outside of giving the usual wage and trying to maintain sanitary working conditions. Labor is generally paid for 10 hours and a nine-hour day is the rule. It is not very competent and changes rapidly from one shop to another.

The Lima Brass & Iron Foundry Co., of Lima, Ohio, has been chartered with a capital of $50,000 by Joseph White, J. M. Burnette, J. T. White, William W. Hodge and Charles H. Allspaugh.

The authorized capital of the Beach Enameling Co., of Coshocton, Ohio, has been increased from $100,000 to $150,000 to permit of increasing the output of the concern.

J. W. L.

PITTSBURGH, PA.

SEPTEMBER 8, 1919.

With Pittsburgh in the throes of another street car strike, business in the metal trades, as well as all other branches of industry, has had a tendency to slow up during the latter part of August. The strike situation is still serious with no settlement yet in sight. The striking car-men continue to hold out for a bigger increase and the Railways Company announces its determination to operate cars with outside men at an early date. Labor unrest with the steel mills, too, is causing considerable anxiety here and until something definite is settled upon, things are expected to continue at pretty much of a standstill. There is not much movement in evidence throughout the construction field locally or in nearby territories, this being due principally to high prices of labor and materials and local unrest.

With the metal working establishments labor conditions are good. Plenty of men seem to be available and wages paid to be satisfactory. A local galvanizing concern reports business about 65 per cent. to 70 per cent. of normal, this applying to domestic trade. The export trade is doing a little better than this with a good outlook toward the future. Mills on this class of work are operating at about 65 per cent. capacity. Prices continue firm. With the bronze manufacturers orders continue to come in good number, although most everything is wanted in a hurry. No business to amount to anything is being booked ahead. These concerns find copper, tin and lead plentiful with prices stiffening. An extraordinary demand for aluminum flux has been noticeable for some time and it is believed this is due to recent advertising of this product and the use of aluminum.

The Damuscus Bronze Company report the construction of a new service station on North Side at an estimated cost of $50,000 to $60,000. It is to be a fireproof structure of reinforced concrete. This concern is also boasting the champion baseball team of the Manchester League. To date a total of 17 games have been won out of 18 played.

J. A. C.

PROVIDENCE, R. I.

SEPTEMBER 8, 1919.

The past few weeks have been a period of industrial unrest and uncertainty the like of which has never before been experienced by business interests in this section.

With the beginning of the month nearly every line of the metal trades in Providence had labor controversies on their hands. Higher wages, shorter hours and closed shop were the demands that came to the ears of the business men. Some of these difficulties have been settled; others are pending and still others remain upon the horizon of the future, threatening at any minute to break out in great suddenness and force.

In this particular respect the jewelry industry may well be said to be sitting over a smouldering volcano. The manufacturers in this industry have been adroitly successful so far in keeping the flames of labor trouble from blazing forth, but evidences are to be seen that indicate that the day is not far distant when a strong labor organization will be established within the ranks of the jewelry workers that will bring the manufacturers to their knees or cause a general tie-up of the trade.

Differences between the Sheet Metal Workers Local 37 and the employers in regard to an increase in pay to $1 an hour were settled early in the month by the union voting to accept a schedule which, it is claimed, is satisfactory to both sides, and which will remain in force until December 31.

The Eagle Cornice Company, 312 Blackstone street, Providence, is owned by Sadie L. Strauss, according to information filed at the city clerk's office.

The Pawtucket Screw Company is erecting a one-story brick addition to its plant on Hughes avenue, Pawtucket. It is to be 36 by 119 feet.

John J. Ward of this city and George P. Stoecke of Pawtucket are the owners of the Continental Bronze Company, 48 Oxford street, Providence, according to their statement on file at the city hall.

A new two-story brick building, covering about 12,000 square feet, is being erected at the corner of Pine and Foster streets for the D. M. Watkins Co., manufacturers of jewelers' findings and metal ornaments, now located at Pine and Eddy streets. It will be 125 feet on Pine street and 100 feet on Foster and is expected to be ready for occupancy in the early spring. It will be of mill construction with many special interior features to accommodate the peculiar work of the Watkins Co. who will occupy the entire building.

The Narragansett Sheet Metal Work Co., 218 Chalkstone avenue, Providence, is owned by David Jaffa and Abraham Nulman, according to their statement filed at the city clerk's office.

Tin owned by the Federal Government is on inspection at the plant of the Gorham Manufacturing Co. preliminary to receiving bids for it at a sale to be held in Boston by the Ordinance Department. There is 30,000 pounds of metal in the lot.

At the plant of the Standard Nut and Bolt Company, Valley Falls, there is said by the officials to be a big demand for the products of the concern, but there continues to be trouble in getting sufficient help of a desirable class to keep pace with the orders. The business prospects for the firm are said to be exceedingly bright.

The extensive plant of the Brown & Sharpe Manufacturing Co., Providence, closed August 1st until the 12th for the annual vacation period and the general overhauling of machinery and renovation of the plant, affecting upwards of 7,800 workmen. The offices were kept open as usual, however. W. H. M.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

Electro-Tin Products, Ltd., of Brantford, Ontario, Canada, has awarded the contract for the erection of a 100x200 ft. tin smelting plant. Estimated cost, $50,000.

The United States Stamping Co., Moundsville, W. Va., manufacturer of metal specialties, has arranged for a new reinforced concrete plant for storage purposes to cost about $75,000. J. M. Sanders is president.

The Standard Brass and Foundry Co., 990 East 67th street, Cleveland, O., will construct a 2-story, 38x59 ft. factory and office building which will include a grinding room, and brass, bronze and aluminum foundries.

The Dallas Brass and Copper Co., 225 North Jefferson street, Chicago, Ill., plans to build a 5-story, 100x135 ft. factory on Orleans street and Institute place. Estimated cost, $200,000. They also make fixture parts and operate a polishing and plating plant.

The Gehnrich Indirect Heat Oven Co., Brooklyn, N. Y., have broken ground for their new plant at Skillman avenue, Buckley and Honeywell streets, Long Island City.

The size of building will be 200 x 144, two stories high with an additional story at one end for executive offices.

The cost of building will be $145,000.

The Interstate Sheet Metal Works, 148 Mulberry street, Newark, N. J., has filed notice of organization to manufacture piping and other sheet-metal products. Daniel Joseph, 30 West 118th street, New York, heads the company. They have a tinning and soldering department; manufacture, install and erect ventilating exhaust and blow-pipe systems for various purposes, and metal portable ovens for backing, japanning and drying.

The Peck & Young Manufacturing Co., Stratford avenue, manufacturer of springs, has awarded the contract for 1 story, 60x200 ft. factory, a 1 story, 40x80 ft. factory addition and a 1 story, 25x35 ft. boiler house. Estimated cost, $50,000.

This company has changed its name to the **Humason Mfg. Co.**, Forestville, Conn. Its officers are: President, I. D. Russell; vice-president, J. M. Carney and S. M. Stone; secretary and treasurer, L. C. Humason. W. L. Humason, formerly president, is now chairman of the board.

In addition to the sale of a portion of the Bridgeport, Conn., plant of the **Remington Arms Co.**, the company is also arranging for the disposition of its works at Swanton, Vt., comprising a two-story concrete building with about 80,000 sq. ft. of floor space, and series of one-story structures aggregating 50,000 sq. ft., which includes a tool room, a grinding room, and a polishing shop.

The Lumen Bearing Co., incorporated in Ohio for $250,000, is preparing to build a brass casting plant on Poland avenue, Youngstown, Ohio. It will manufacture bronze bearings. The company is owned and controlled by the Buffalo company of the same name. The plant will include the following departments: smelting, refining, brass, bronze and aluminum foundries, brass machine shop, tool room and grinding room. H. P. Herrock, formerly of Youngstown, is general manager and W. H. Barr is president.

An inventory of the Eddystone Rifle plant, near Philadelphia, which has just been completed, shows that 15,097 employes were used at the peak of production during the war, with a weekly payroll of $402,817. The pipe lines of the plant would reach from this city to Trenton; the leather belting from here to New York, and the electric drop cords would equip every house in a city of 40,000. In about three years the Eddystone plant produced 1,352,477 U. S. rifles and 607,092 British Enfield rifles. The average production was 5,000 a day.

The Manitowoc Aluminum Specialty Co., Manitowoc, Wisc., has opened negotiations with the Chilton Advancement Association, Chilton, Wis., with the view of relocating its plant. The tentative plans call for a three-story factory, 60x200 feet, and a steam generating power plant 30x55 feet, estimated to cost $75,000. This will be a branch of the Manitowoc plant. Contract for the building has been let and most of the orders have been placed for machinery and equipment. The plant will include a tool room, grinding room, spinning room, stamping room, and tinning room. Walter Spindler is president and general manager.

E. **E. Steiner & Co., Inc.,** are now located in their new plant at No. 20 Orange Street, Newark, N. J.

The new factory building, 220x60, of the **H. C. Cook Co.,** Ansonia, Conn., which is now under construction, will probably be completed by Nov. 15. It includes a tool room, grinding room, plating, stamping and polishing departments.

The Bridgeport Brass Co., Bridgeport Conn., has plans for an extension to its foundry estimated to cost $100,000. Henry M. Lane, 701 Owen Building, Detroit, Mich., is the architect and engineer.

The erection of structural steel for a four-story factory addition at Two Rivers, Wis., for the **Aluminum Goods Mfg. Company,** Manitowoc, Wis., was seriously delayed by a gale on July 28, which wrecked a considerable part of the structure and caused an estimated loss of $25,000.

Q. Heft Company, 400 North Ashland avenue, manufacturers of dies and metal specialties, has awarded the contract for a 1 and 2 story, 120 x 120 foot factory, to be erected on Kinzie near Paulina St. Estimated cost, $35,000 to $50,000. The plant will include a tool room, cutting-up shop, galvanizing, stamping and tinning plant.

The Ohio Blower Co., Cleveland, has placed contracts for two extensions 60 x 110 feet, and 80 x 160 feet, four stories. This plant is used for the manufacture of ventilators, automobile bodies and other sheet metal work, and will include a brass machine shop, a tool room, a grinding room, a cutting up shop, brazing and soldering.

The Coppus Engineering & Equipment Co., Worcester, Mass., manufacturer of steam turbines and blowers, will increase its brass foundry by a brick and steel extension, 55x240 ft., with monitor roof to permit of a traveling crane. Steele-Harvey furnaces and other equipment will be installed, and the capacity will be quadrupled. A bronze and aluminum foundry will be included. The company will increase its capital stock from $100,000 to $250,000 and some of the new shares will be set apart for purchase by employes under an easy payment plan.

S. Blickman has let contract to Levering & Garrigues, Construction Engineers, New York City, for the erection of our new factory located in Long Island City.

Building is of reinforced concrete design heavy construction and has a floor area of 182,000 square feet distributed over six floors. The plant will be devoted to the manufacture of specialties in the sheet metal field including large stamping work, machining, plating and polishing, japanning, spinning, tinsmithing, coppersmithig and automatic screw machine products. Among the special features of the construction is the provision made for several 500 ton drawing presses.

Workmen employed in the fine brass weaving department at the Worcester plant of the **Clinton-Wright Wire Co.,** are daily engaged in conducting some interesting experiments in weaving aeroplane cloth. This cloth is made of bessemer steel wire and cotton thread. The warp is two-thirds cotton and one-third steel. The wire used is .005 in the warp and .007 in the filling. The woven product is electro galvanized in the galvex department of the Worcester plant, and makes a firm and durable fabric. It is proposed to use this cloth for the wings of aeroplanes, the idea being to produce a non-inflammable aeroplane, beside insuring the wings and other cloth parts against tearing.

The Jordan mill property in Waterford, Conn., was sold Tuesday by Howard C. Russ and Arthur T. Beach of New York to James Bathgate, president of the Niantic Manufacturing Co. of East Lynne.

Messrs. Russ and Beach purchased the Jordan mill property about one year ago and organized the Apex Pulverizing Company for the manufacture of pulverized aluminum for use in star shell. The plant had been thoroughly equipped and had turned out one war order when the armistice was signed and war contracts were cancelled.

The Driver-Harris Company, Harrison, N. J., is now selling its Wire Rope Products direct to the trade instead of through its former selling agents. These products include sash cord and tiller rope in plain iron, galvanized iron, phosphor bronze, special bronze, Monel metal, and all special grades. In addition to this, the company has increased its facilities to include all grades of rope in 6x7, 6x12 and 6x19 construction, such as drilling cable, elevator rope, haulage rope, sand lines, etc., in all sizes up to ¾ inch. The other products of the company are resistance materials of nickel alloys in the form of wire, strip and sheet for electric heating controllers, rheostats and resistance elements, wire for spark plugs and weaving; rods and sheets of pure nickel and its alloys; cold rolled strip steel; Nichrome castings such as annealing boxes, carbonizing boxes, pots, tubes, rotary and stationary retorts, dipping baskets, pyrometer protection tubes, etc.; flexible heater cord and thermostrip.

The sale of the manufacturing plant, real and personal, of the **Bridgeport Tube Works** at 250 North avenue, Bridgeport, Conn., resulted in the real estate being purchased by H. B. Houghton of Asbury Park, N. J., for $17,400, assessed valuation being $13,098; the raw material and stock in process brought $9,796.98 by the pound, the machine tools and the machinery and the mechanical equipment brought $26,020.05, the total sale aggregating $53,217.03. The 376 catalogued lots were sold in six hours, as planned. Those most particularly interested in the result of the sale were unanimous, at the end of the sale, in their expressions of agreement as to the unqualified success of the sale. The principal purchasers were as follows: The National Brass & Copper Company of Lisbon, O.; H. A. Staples of Plainfield, N. J.; the J. H. Claussen Copper Works of Brooklyn; the Warren & Irrgang Company of Springfield, the Bristol Brass Corporation of Bristol, Conn.; the Randolph Clewes Company of Waterbury, Conn.; the N. Armstrong Company of New Haven.

INCORPORATION

Articles of incorporation were filed with the secretary of state yesterday by the Indiana Smelting & Refining Corporation of Indianapolis. The capital of the company is $100,000 and the directors are Max Robbins, Lawrence Olsen and William R. Jenkins. The corporation was formed in order to enlarge the Indiana Smelting & Refining Company. The company's present plant is at 341 West McCarty street. The company smelts and refines metals and manufactures steel. Mr. Robbins is president of the corporation. Mr. Olsen said that the plant would be enlarged, but that no definite plans could be announced concerning the additional number of men to be employed.

CHANGE IN ORGANIZATION

A department of the Waterbury Brass branch of the **American Brass Company,** known as the cutting-out shop, has been merged with the Waterbury Brass Goods Corporation, another branch of the American Brass Company, which is engaged in the same line of work as this particular department. The change, which has already gone into effect, affects about 150 employees of the Waterbury Brass branch, and they are now under the supervision of the Waterbury Brass Goods Corporation management. The change is described by officials of the company as a minor one, made to consolidate two departments that are engaged in the same line of work.

From now on the Waterbury Brass Goods Corporation will do all the "manufacturing" done by the American Brass Company in this city, the term "manufacturing" in this instance meaning the making of articles out of the sheet brass and tubing that are turned out by the other departments of the one big plant.

INCREASE IN CAPITAL STOCK

The certificate for the increase in the capital stock of the **M. L. Oberdorfer Brass Company** from $50,000 to $500,000 has been filed with the Secretary of State. The old stock was in 500 shares of $100 par value, and was held by the Oberdorfer family. The new issue comprises 4,000 shares of common and 1,000 shares of 6 per cent. preferred, each of $100 par value.

Announcement is made of the election of Joseph L. Goodman as a director of the company. The other directors are Moses L., Jesse L. and Jonas L. Oberdorfer.

The company recently announced its plans for the erection of a new addition to its plant in East Washington street.

BUSINESS TROUBLES

After substantially a three days' sitting the hearing on the claim of the **Brass and Metals Manufacturing Company** of Kansas City against Harry C. Dodge, trustee in bankruptcy of the **Metals Production Equipment Company** of Chicopee, was adjourned yesterday by Referee Charles W. Bosworth of the Bankruptcy Court to Sept. 16.

In the matter of **Philadelphia Bass Co.**, bankrupt, a meeting of the creditors was held at the office of the referee, Thomas R. Haviland, at North High street, borough of West Chester, Chester county, Pa., on Thursday, Sept. 4, at which the receiver's accounts were examined.

AUTHORIZATION

The French Metal Corporation, Delaware, $5,000; representative, C. P. Lyman, 5 Nassau St., New York city.

FIRE

Fire destroyed the entire business section and a score of residences in East Helena, a town of 3,000 near here, and for a time threatened the great smelter of the Smelting and Refining Company. Reports tonight from Great Falls said that the little town of Monarch was threatened by a forest fire which had crept down the mountainside, sending a shower of sparks over the houses. Bucket brigades kept the flames in check.

PRINTED MATTER

Cork Insulation.—The Armstrong Cork and Insulation Company, Pittsburgh, Pa., has recently issued two very interesting booklets, one of which is called Nonpareil Corkboard Insulation for Cold Storage Rooms and Freezing Tanks and the other is Saving 63 Per Cent. of the Drinking Water Expense, in mills and factories. These bulletins may be had upon application. In the case of the corkboard insulation catalog, a 152-page book is obtainable, while there is a 48-page book published regarding drinking water systems.

A booklet from the National Industry Conference Board just reached us, on the **"Hours of Work as Related to Output and Health of Workers."** It is an authoritative report covering a number of plants which have reduced their working hours, and a comparison of the work turned out before and after changes; also the effect of shortening hours on the health of workers. Those interested in the report can obtain it by writing for Research Report No. 18, July, 1919, The National Industrial Conference Board, 15 Beacon St., Boston, Mass.

The Houghton Industrial Digest, a lively, hustling little publication, full of useful information and interesting material, includes the article on crucibles by A. C. Bowles, published in THE METAL INDUSTRY. This publication specializes in oils and leathers, but necessarily enters many other fields because of the ramifications and connections which its own field has. It can be obtained from E. F. Houghton & Co., Philadelphia, Pa.

"Certificate" Metals, put out by White & Bros., Philadelphia, is a most attractive catalogue with a clear-cut presentation of the new policy of the company, and excellent photographs of their laboratory and testing room. This principle of certification of metals is a new one and deserves all commendation.

We have just received a copy of the paper delivered at the June meeting of the American Institute of Chemical Engineers, Boston, Mass., by T. F. Baily, on the resistance type of electric furnaces for melting non-ferrous metals. Those interested can obtain it by writing for booklet 13-B to the Publicity Department of **The Electric Furnace Company, Alliance, Ohio.**

Those interested in fuel oil, petroleum, and allied substances, can be directed to the information they need by the Bulletin 165, isued by the Bureau of Mines, entitled **"Bibliography of Petroleum and Allied Substances in 1916."**

The Council of National Defense has issued a digest of a report on the high cost of living, which is being transmitted to the members of Congress by the Secretary of War, who is chairman of the above council. This digest can be obtained from Grosvenor B. Clarkson, Director, Washington, D. C.

The Bureau of Standards has issued **Scientific Pages No. 337** on the Constitution and Metallography of Aluminum and its light alloys with copper and with Magnesium, by P. D. Merica, Physicist; R. G. Waltenberg and J. R. Freeman, Jr., Assistant Physicists.

Safe Practices No. 25 has just been issued by the National Safety Council in response to requests from a great many industries in which acids and caustics are used. It is an orderly presentation in 16 pages, loose leaf form, of accident hazards involving acids and caustics and the best practices for the elimination of such hazards.

This bulletin, representing the efforts and knowledge of the Conference Committee of fifty safety engineers, is one of the most important safe practices pamphlets yet issued by the Council and probably the most concise collection of information on the subject. It includes a brief discussion of accident hazards and the best practices for their elimination, in handling the most common industrial acids and caustics, as follows:

Nitric acid, Sulphuric acid, Mixed acid, Hydrochloric acid, Hydrofluoric acid, Carbolic acid, Oxalic acid, Picric acid, Acetic acid, Carbonic acid, Hydrocyanic acid, Alcohols, Ammonia, Caustic soda, Caustic potash, Soda ash and Lime.

It has been the experience of the members of the National Safety Council that three-fourths of all accidental deaths and injuries in industry can be eliminated and this is as true of acid and caustic accidents as of any other class. Safe Practices No. 25 is profusely illustrated, among the photographs shown being one picturing complete protection for workmen in a metal pickling room, the effect of acid on clothing ventilating system for removing acid fumes, a one-man two-wheel carboy carrier, protection of acid valves and others.

They have also issued an executive series bulletin on "Some Practical Aspects of Employes' Representation." The bulletin gives the digest of five typical employes' representation plans, which have been instituted by the Colorado Fuel and Iron Co., the International Harvester Company, the Philadelphia Rapid Transit Co., and the Bridgeport plan of the War Labor Board (adopted in 65 munition plants in Bridgeport, Conn,), and William Demuth & Co. As the National Safety Council is a clearing house of information on accident prevention and allied subjects the bulletin contains only information, not opinions or recommendations.

CATALOG EXHIBIT

TIN-PLATE MANUFACTURE IN JAPAN*

In Japan the demand for tin plate is continually increasing. The manufacture, however, can not be pursued profitably in this country. Most of the imports come from America. In 1916 about 65,000 pounds were imported, but thereafter the annual shipments were reduced to 40,000 or 45,000 tons, owing to the war. Since the proclamation of the armistice imports have been showing a slight increase, but are not sufficient to satisfy the demand in this country. It is reported, according to the Japan Chronicle, that the Yawata State Steelworks in Kyushu have for some time past been carrying on experimental work in the manufacture of tin plate, and the results are so promising that commercial manufacture is soon to be started and the product put on the market.

*Consul General George H. Scidmore, Yokohama.

METAL STOCK MARKET QUOTATIONS

	Par.	Bid.	Asked.
Aluminum Company of America.....	$100	$525	$625
American Brass	100	220	225
American Hardware Corp.....	100	157	...
Bristol Brass	25	34	37
International Silver, com.....	100	30	35
International Silver, pfd.....	100	92	95
New Jersey Zinc	100	240	245
Rome Brass & Copper.....	100	280	330
Scovill Mfg. Co.....	100	400	410
Yale & Towne Mfg. Co.....	...	250	265

Corrected by J. K. Rice, Jr., & Co., 26 Wall Street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

COPPER.

Total August sales of refined copper are estimated in the trade to have approximated 100,000,000 pounds, of which 40,000,000 pounds were sold for export, as compared with total July sales of double that amount, including probably 60,000,000 pounds for export. While producers adhered firmly to prices quoted in July, 23.50c for nearby and 24c for last quarter shipments, prices in the outside market fluctuated within a range of 1.00c to 1.75c per pound, the net result being a decline of nearly ¼c per pound on Lake copper and an advance of the same amount on casting copper for October shipment on both kinds. Electrolytic copper, during August, declined to as low as 21.75c for prompt and September, 22c for October and 22.50c for November, but closed at approximately the same prices that prevailed at end of July—22.50c for spot and September, 22.75c for October and 23c for November. Casting copper declined to 21.50c for prompt and to 21c for October shipment, but closed firmer at 22c for prompt and September, 22.25c for October and 22.50c for November.

Unsettled conditions in the copper industry were due largely to the disturbing labor factors affecting all industries as well as transportation systems. Railroad embargoes, due to congestion of freight, seriously interfered with deliveries on contracts, but in the copper industry itself, conditions were greatly improved during the last fortnight and greater confidence in regard to transportation facilities was expressed. It is interesting to note the result of trade estimates, regarding domestic consumption of copper in the five years immediately preceding the war, the five years during the war and today's average as compared with the monthly pre-war average when 61,000,000 pounds covered requirements. During the war period the monthly average was 101,000,000 pounds and today's monthly average is 81,000,000 pounds indicating present requirements of about 25 per cent more copper than in the five-year period before the war. Exports of copper in July, for which government figures became available about the middle of August, were even heavier than had been anticipated, 21,000 tons being reported. Total exports during first eight months of this year, it is now estimated, will approximate 136,000 tons indicating a monthly average of 19,000 tons.

TIN.

The most interesting developments in the tin market affecting prices and sentiment in the trade, last month, were the readjustment of the spot market, following the lifting of the embargo against importation, the heavy arrivals—5,215 tons—at both Atlantic and Pacific ports with nearly 4,000 tons reported afloat, the violent fluctuations in sterling exchange and the rebate of nearly 3c per pound, on government tin sold through the U. S. Steel Products Co. The government maximum price, 72.50c per pound, was established in December, 1918, and expired in June, 1919, when the entire quantity contracted for by the Inter-Allied Tin Committee had been disposed of in this country. Prices of spot Straits tin in the open market in April, were quoted at from 1.00c to 1.25c per pound under the government figure and the average since that time has been about 70.50c. American pure and 99% tin, were obtainable in limited quantities during this time at from 67-69c for the latter and at from 67 to 72.50c for the former. Last month, prices of Straits tin, after being held nominally at 70c during the first fortnight, dropped to 60c on Aug. 18, and by Aug. 29, was quoted at 55.75 to 56c. Some active business in future deliveries at cut prices, was done in the last week, which was due to differences in calculating the effect of fluctuating exchange rates and prices of September shipments from the Straits were down to 52.50c, October to 52.25c, while at the same time, prompt shipment from England was purchased at 53 to 53.25c per pound. American pure tin which early in August was held at 69 to 70c, at the end, was 55.37½c to 55.50c and American 99% in the same period of time declined from 66.50-67.00c to 54.50-54.75c per pound. The drop in spot prices ranged from 13c to 15.50c per pound.

SPELTER.

Like other metals trades, in August, the zinc industry was adversely affected by the generally unsettled conditions prevailing in transportation and the unrest of labor. Only a small volume of business was transacted, the greater portion of which was done in the last half of the month. Prices declined in the second week to the lowest point, 7.25c East St. Louis, 7.60c New York, after which in the following week, under the influence of more active trading in the copper and lead markets, there was a sympathetic recovery in zinc to the highest figures of the month, 7.65c East St. Louis, 8.00c New York for prompt prime Western. In the last week, the threatened strike in the steel industry acted as a deterrent factor in the galvanizing business and prices again declined; 7.50c East St. Louis, 7.85c New York, these figures being 5 points above the July closing and representing an advance of ¼c from the lowest prices in August. Producers being well sold, were reserved throughout the month and not inclined to meet the lower prices. Production was reported curtailed to 30,000 tons, the Anaconda electrolytic refinery being shut down. Gas prices at smelters after being doubled, were reported to be about to repeat the performance in another rise of equal amount.

LEAD.

The lead market opened in August, with small interest on the part of large buyers whose requirements had been well covered previously, and prices in the outside market, during the second week, declined to 5.40-5.50c East St. Louis, 5.50-5.60c New York, for prompt metal. At these prices, cheap lots in the hands of speculators and dealers, were soon eliminated, which added strength to the market, and by Aug. 19, prices had recovered to 5.65c East St. Louis, 5.75c New York, for prompt; September position being 5 points higher. After considerable business had been transacted in the last week, prices in the outside market closed at 5.65-5.75c East St. Louis, 5.85-5.90c New York, a net advance of 10 points and which brought prices in both markets practically together again. The American Smelting & Refining Co., throughout the month, maintained its basis at the figures established in July—5.75c East St. Louis, 6.00c New York; being well sold up, they were indifferent as to making sales and were not disposed to meet the market at cut prices.

SILVER.

Fluctuations in prices of silver in August were frequent and violent, the total range being 7¼c per ounce from the lowest point, $1.08 on the first day, to $1.15¼, the highest point, reached on August 27. A rapid decline in the next two days carried back to $1.08⅛ per ounce, making the net rise for the month only ⅛c. Considerable uneasiness exists in the trade regarding the well known and increasing inadequacy of current silver production the world over, to meet requirements. In this country it is estimated that the 1919 output of silver will fall short of normal production by 25,000,000 ounces, because of the heavy curtailment in production of copper, lead, zinc and gold from which two-thirds of our silver output is derived as a by-product.

QUICKSILVER.

The arrival of large supplies of quicksilver, late in August, relieved the scarcity, and prices, which previously had been steadily maintained at $109 per flask of 75 lbs. since the beginning of the month, rapidly declined to $95 by August 28, after which no further change was made. The total decline amounted to $14 per flask.

PLATINUM.

Under the influence of steadily increasing demand and growing scarcity of metal, prices of platinum, after being firmly maintained at $105 per ounce, were advanced $5 to $110 per ounce on August 29. Reported discovery of large deposits of platinum in the South Pacific Islands, it is hoped, may be developed promptly to relieve the threatened famine.

OLD METALS.

Declining prices and increasing dullness characterized the old metals trade during the first three weeks of August. In the last week, although considerable activity was developed in copper and brass, as well as in aluminum, lead and type scraps, consumers' orders were not plentiful and dealers' supplies in warehouses remained large. The heaviest declines were 7c. to 43c. on block tin pipe and 5c. to 30c. on No. 1 pewter. Cocks and faucets were off 2c. to 14c. Strictly crucible copper was down 1½c. to 18.50c. and clean red car boxes, a like amount to 15c. Uncrucible copper wire declined 1c. to 16.50c. and ½c. declines carried light copper to 15c.; new brass 12.50; light brass to 9c.; new zinc to 5.75c. and old scrap zinc to 4.75c. Aluminum held better, clippings being unchanged at 24c. and old sheets at 23c., but old cast was down 1c. to 22c. per pound.

ANTIMONY.

Antimony, in common with the general depression affecting other metals, in August, suffered a decline in prices of 5.8c per pound on both wholesale and jobbing business—from 9.25c to 8.62½c duty paid, New York, on the former and from 9.37½c to 8.75c on the latter. Only a small volume of business was done. Two important factors in the decline were, government surplus known to be for sale at various points—notwithstanding the fact that the bulk of such war metal had been taken over some time ago by prominent interests—and the resale of lots of shipment antimony on the Pacific coast, at prices shading the New York figures. Chinese antimony, at the same time, for importation, was held at 1.00c per pound above the New York prices, at the equivalent of 10c per pound, duty paid, New York.

ALUMINUM.

The aluminum market suffered less from the general depression than other metals in August. The price of No. 1 virgin ingots, early in the months, declined from 32-33c to 30.50-32c and 98-99% remelted from 30-32c to 29-31c because of offerings at these prices, of French metal in the New York market. No. 12 remelted was unaffected by these sales. By Aug. 11, all of the French metal had been sold and prices advanced to 31-33c for ingots, 30-32c for 98-99% remelted and to 28-30c for No. 12 remelted. With increasing demand, prices a few days later, were again advanced to 32-33c for virgin, 31-32c for 98-99% remelted and to 29-30c for No. 12 remelted, making the advance 1½c per pound on virgin and 2c per pound each, on 98-99% and on No. 12 remelted. The American Aluminum Co. made no change in its prices during the month.

WATERBURY AVERAGE

Lake Copper. Average for 1918, 24.75. 1919—January, 23.00. February, 18.00. March, 15.50. April, 15.50. May, 16.37½. June, 17.75. July, 22.00. August, 22.00.

Brass Mill Zinc. Average for 1918, 9.858. 1919—January, 9.00. February, 8.20. March, 8.00. April, 6.90. May, 6.80. June, 7.25. July, 8.10. August, 8.10.

AUGUST MOVEMENTS IN METALS

Copper—	Highest.	Lowest.	Average.
Lake	23.50	22.00	22.750
Electrolytic	23.375	21.00	22.083
Casting	22.50	21.00	21.688
Tin	71.00	55.37	59.375
Lead	6.00	6.00	6.00
Zinc (brass special)	8.00	7.60	7.863
Antimony	9.25	8.62	8.875
Aluminum	33.00	30.5	31.833
Quicksilver (per flask)	$109.00	$95.00	$102.00
Silver (cts. per oz.)	115¼	108.5	1.12⅛

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities, which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, September 8, 1919

NEW METALS

	Cents.
Copper—Duty Free. Plate, Bar, Ingot and Old Copper. Manufactured 5 per centum.	
Electrolytic, carload lots	22½
Lake, carload lots	23⅛
Casting, carload lots	22
Tin—Duty Free.	
Straits or Australian, carload lots	56
Lead—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	5.90
Zinc—Duty 15%.	
Brass Special	7.90
Prime Western, carload lots	7.85
Aluminum—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	...
100-lb. f. o. b. factory	...
Ton lots, f. o. b. factory	33

Antimony—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	8⅝
Nickel—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.	
Ingot	41c.
Shot	43c.
Electrolytic	45c.
Manganese Metal	Nominal
Magnesium Metal—Duty 20% ad valorem (100 lb. lots)	$1.90
Bismuth—Duty free	nominal $3.10
Cadium—Duty free	nominal $1.50
Chromium Metal—Duty free	nominal
Cobalt—97% pure	$2.50
Quicksilver—Duty 10% per flask of 75 pounds	.95
Platinum—Duty free, per ounce	$110.00
Silver—Government assay—Duty free, per ounce	$1.13⅝
Gold—Duty free, per ounce	$20.67